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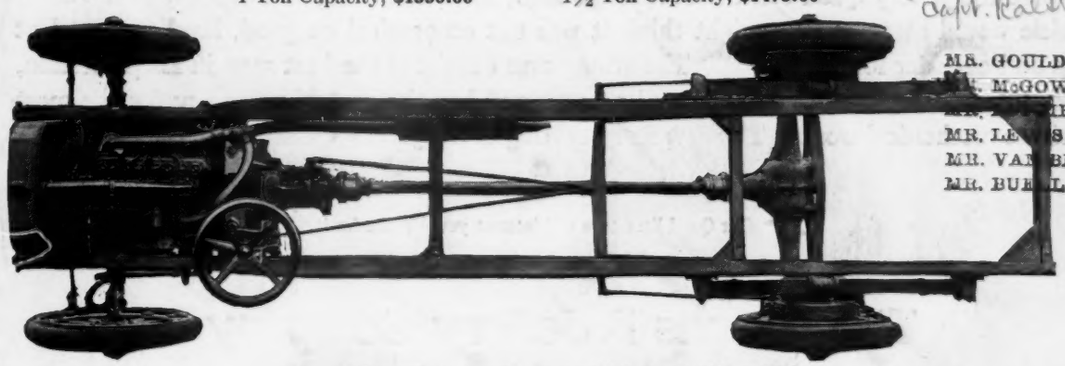

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Because the Jeffery Quad can travel through mud, snow and sand, and over grades no other vehicle would attempt, one might think it was not economical on good, level roads. But stop and consider for a moment. The strong-arm dentist is the best man in his profession, other things being equal. He can pull a tooth and has the control necessary for the most intricate mechanical work. The new story-catalog of the Jeffery Quad points the analogy.

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The Thomas B. Jeffery Company

Kenosha, Wisconsin, U. S. A.

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THE PUBLISHERS' PERSONAL PAGE

Boldness is power: ignorance is weakness

Truck Investments Begin

The reaction has set in: the momentary halt caused by the war has passed. The big business men of the country are again showing their accustomed boldness, and large orders are being placed for trucks. The first three months of 1915 have broken the record for truck sales. Heavy investing in motor trucks may now be looked for.

Modern Growth Left Horse Behind

The horse has been outgrown: one might as well attempt to fill a freight car with a tablespoon as to haul modern freight by horse methods. The day of the horse is past. Business has outstripped, outweighed him. Cities have outgrown the horse radius and modern developments demand modern methods. Within a limited area of two square miles in Chicago it is estimated that 150,000 tons of freight are hauled daily. The horse is too slow. Railroads are spending millions to save a few minutes for their patrons. City transportation methods must keep pace with other developments. The motor-driven truck is the only solution of the modern transportation problem.

Chicago Commissioners' Report Proves Horse Wasteful

"The horse is wasteful, inadequate, and utterly unfit to cope with the stupendous hauling problems of to-day," says the recent report of the Chicago Municipal Market Commission. "Animal transportation is out of place and an archaic survival; unnecessary delays exist in the central business district due to the use of the horse." It further states, a detailed comparison showing the cost of hauling by horses and wagons and motor vehicles indicates that the average cost of hauling by motor is eleven and one-quarter cents per ton-mile, while that by horse is seventeen and three-quarter cents. Truly, the horse has outlived his usefulness as a freight carrier in congested districts.

The CCJ is the only truck journal a member of the Audit Bureau of Circulations—Why?

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The Autocar Company

MANUFACTURERS OF

MOTOR VEHICLES

ESTABLISHED 1897

CABLE ADDRESS
AUTOCAR, ARDMORE
A.B.C. CODE

ADDRESS ALL COMMUNICATIONS
TO THE COMPANY

ARDMORE, PA. March 17th, 1915.

Autocar Sales & Service Company,

23rd & Market Sts., Philadelphia.

Attention of Mr. P. Prouty, Manager

My dear Mr. Prouty:-

We wired you today as follows:

"You are authorized to announce that the price of the Autocar motor delivery chassis has been reduced to sixteen hundred and fifty dollars. Letter follows."

This is the third reduction in the price of our chassis since January 1st, 1913. First we reduced from $2150 to $2000; then from $2000 to $1850; now from $1850 to $1650.

We now have twenty-four hundred different customers using from 1 to 280 Autocars each. Our business has increased 33 1/3% and 50% are repeat orders.

An increased list of customers and an increase in the volume of business will as in the past result in decreased expense of production and distribution; therefore keep advertising and continue strengthening your sales and service organization, as we propose to follow the policy of furnishing the consumer our product at the lowest possible price.

Yours very truly,
THE AUTOCAR COMPANY,
H. M. Coale
Sales Manager.

HMC-MM

The Commercial Car Journal

VOLUME IX | PHILADELPHIA, APRIL 15, 1915 | NUMBER 2

MANY IMPORTANT PAPERS TO BE READ AT CONVENTION

Alvan Macauley Will Read Paper on "Service Policy," at Detroit Convention in May, Three Sessions to Be Devoted to Important Addresses and Discussion by Trade Leaders

At the motor truck convention to be held May 5th and 6th at Detroit, by the National Automobile Chamber of Commerce, there will be a paper on "Can Manufacturers Have a Standard Service Policy?" by Alvan Macauley, vice-president and general manager of the Packard Motor Car Company, and also a member of the Commercial Vehicle Committee of the National Automobile Chamber of Commerce. He has consented to prepare and deliver this paper, which will treat of the co-operation of the manufacturer and dealer with the truck user to insure the most satisfactory and economical operation of the vehicles.

This is one of the most important subjects to come before the meeting, and it is planned to present for discussion a form embodying the provisions of a service policy that has been in successful use by the Packard Company during the past year and to have the convention recommend the form, with such modifications as may be agreed upon, for adoption as a standard.

A dozen or fifteen other papers on questions to which the manufacturers of commercial cars have been seeking solutions for the past year or two are provided for on the program that is being prepared by the Commercial Vehicle Committee. These will be written by well-known leaders in the industry. Four or five will be delivered at each of three sessions and the reading will be followed by a general discussion of each paper, led by other makers, who are known to have given the subjects much thought.

In order that the greatest and most lasting good may result from the convention, efforts are to be made to crystallize opinions on the different subjects and pass resolutions favoring the adoption of standards of practice that will become general.

Another paper to be read at the motor truck convention will be one on "Advantages of Selling on Time Payments and How Such Sales Should Be Handled." Windsor T. White, president of the White Company and chairman of the Commercial Vehicle Committee of the N. A. C. C., has consented to deliver the paper on this subject, which has engaged the attention of motor truck makers and dealers for a long time.

Standard Load Rating for Motor Trucks

Another important question that will be considered will be a uniform way of determining the load capacity of commercial cars. A paper on the subject, under the title "Can a Standard Load Rating be Devised and Approved by the Manufacturers?" will be presented by H. Kerr Thomas, assistant manager of the Pierce-Arrow Motor Car Company, and a member of the Commercial Vehicle Committee of the N. A. C. C. Mr. Thomas has made a study of this problem and has worked out a formula based on horsepower, gear ratio, wheel diameter, tractive effort and other factors, by means of which the capacity of any truck can be calculated, just as the standard horsepower formula is used for determining the power of an automobile engine.

It is expected that the subject will elicit a lively discussion, as the manufacturers have felt the need for some time of a means for standardizing load capacities. At present there is no way of telling how one truck compares with others except by a careful comparison of all the specifications, or whether, in fact, it is conservatively rated or overrated. Each maker rates his vehicles according to the views of his own engineers, yet these individual load ratings are used as the basis for the standard speed ratings, manufacturers' warranty, body weight allowances, and other standards that have been adopted.

If the complicated and difficult problem of standardizing load ratings can be solved by the convention, it will be to the advantage of the users as well as the manufacturer and dealer.

Invitations to attend the convention have been sent by the National Automobile Chamber of Commerce to all the active established manufacturers of commercial motor vehicles. Arrangements for the convention were made by M. L. Pulcher, William E. Metzger and Alfred Reeves, general manager of the N. A. C. C., during a visit to Detroit by Mr. Reeves. Get-acquainted buffet luncheons will be served each day in the banquet hall of the Statler Hotel, and there will be an entertainment for convention delegates the first night.

Another paper to be read has the title of "Can the Dealer Make Money Selling Trucks, and if Not, What Is His Function?" This paper has been written and will be delivered by Robert O. Patten, sales manager of the Pierce-Arrow Motor Car Company.

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MARKET FOR TRUCKS ABROAD

P. D. Saylor, managing director of the Goodyear Tire and Rubber Company, of Great Britain, recently paid a visit to Akron. He says of trade conditions abroad:

"As far as the United States is concerned, there is apparently a fine market in England now for one- and two-ton trucks for regular commercial use. Most of the English trucks go to the army, and business organizations have a hard time supplying themselves. I recently tried to buy a truck for the use of our own Company, and called on the representatives of one British truck manufacturer after another. None of them would listen to me. 'We can't help you out,' they said. 'The government is taking our product as fast as we can make it, and of course the government has first call.'

"Of course American truck manufacturers should have the best possible representation, or, better still, send their own representatives to handle the business.

"Early in the war there was a strong advertising campaign made for British-made goods, but at this time I do not think there is any discrimination against the 'made-in-America' product.

"The principal difficulty now would be getting the goods across. Shipping facilities are crippled because the government is using so many ships for army transports, etc.

"Just now, as indicated, the principal activity is in trucks. Pleasure cars have been subjected to the rigors of war. Men who own cars are often so situated they cannot afford to run them.

"Chauffeurs by thousands have joined the army. Cars must not display bright lights. No pleasure cars have been commandeered by the government, however, despite the demand for any vehicles in truck form."

The CCJ leads in circulation, advertising and prestige

ATTEMPTS TO LIMIT SIZE OF COMMERCIAL CARS STIRS NEW YORK TRADE

The following proposed ordinance for New York City called forth a vigorous protest from the truck interests:

PROPOSED ORDINANCE RE-SIZE OF VEHICLES

Every vehicle in whatever manner or by whatever force or power the same may be driven or propelled, which is or may be used for or adapted to pleasure riding or the transportation of passengers, baggage or merchandise upon the streets or roadways of this city, shall not exceed the following dimensions:

Length ..... 24 ft. 6 in.
Height ..... 12 ft. 2 in.
Width ..... 7 ft. 6 in.

Nothing in this article shall apply to the apparatus and wagons of the fire and police departments, fire patrol, vehicles which run only on rails or tracks, or which are used to carry rails, pillars and columns of iron, steel, lumber or theatrical scenery.

The truck mens' side of the argument was voiced at a meeting of the Citizens' Street Traffic Committee of Greater New York City on March 25th by William P. Kennedy as follows:

The reasons given for the proposed ordinance limiting the dimensions of vehicles to those stated is that the large sized vehicles are an impediment to traffic. This proposition should be properly analyzed before any action is taken. The largest loads practicable to haul through the streets are the most economical for those interested in the cost of transportation. Many classes of heavy hauling, where the delays are frequent and the daily mileage small, as exemplified along the water front and other congested districts, are very largely done by horses, and motor vehicles cannot hope to compete unless they can carry loads considerably heavier than horses can haul. This necessarily calls for larger vehicles.

It is desirable of course to get rid of horses in city traffic.

There are many obvious and well-known arguments to support this statement.

The reduction in number of the vehicles upon the streets.

Two heavy motor trucks will supplant, at least, three heavy horse trucks. One light motor truck will supplant, at least, two light horse vehicles.

Lesser wear upon pavements.

Lesser real estate occupied. The stable which is more objectionable than the garage is eliminated.

The elimination of street litter from horses, with its heavy cost of removal.

The obvious consequent sanitary advantage, on the streets and at stable locations.

Quicker movement of vehicular street traffic.

Reduction of fire risk, due to the better control and storage of motor fuel than of hay and straw in stables.

Reduction of dust nuisance.

The well recognized reduction of transportation expense.

Therefore any restriction tending to retard the elimination of the horse should be carefully considered. Such restrictions may seriously interfere with logical and economical employment of the large horse vehicles which must and will be used for some time to come. Certain of the horse trucks now in use exceed the proposed dimensions by several feet. There are now in operation motor outfits each 26 ft. 3 in. overall length, 19 of which have removed over 250 horses from the city streets in one installation.

Two or more vehicles within the proposed limits of size, either horse or motor propelled, will take up much more room in the streets than one large one necessary to carry the same load. For instance, assume a motor outfit to carry 10 or 12 tons is 28 ft. overall and to carry the same load two horse trucks, each 25 ft. long; or two motor trucks, each 20 ft. long are required. It is obvious that the smaller vehicles would occupy much more space in the street and cause more impediment to traffic than the single large one.

The larger the vehicles are the fewer of them are required to perform any given volume of transportation and in the case of motor vehicles their speed will be lower, hence there is less likelihood of accident and a reduction of street surface wear.

Possibly there might be some good reasons for restrictions on very large vehicles in certain streets, or localities, or during certain hours of the day, but there should be no general restriction to the dimensions proposed.

TRUCK EXPORTS DOUBLE PASSENGER CARS

Influence of War on Automobile Business Shown by 53 Per Cent Reduction in Passenger Car Exports and Increase of 811 Per Cent in Truck Exports

In the 7 months ended with January, the United States exported 3972 commercial cars valued at $10,989,442. This is an increase of 811 per cent. over the same period a year ago, when only 436 trucks worth $714,261 were sent abroad, as computed by the National Automobile Chamber of Commerce from the Monthly Summary of the Department of Commerce for January, just issued.

Foreign purchases of passenger cars fell off from 13,553 worth $12,540,593 in the 7 months ended with January, 1914, to 6904, valued at $5,808,099 in the corresponding period just passed. This is a decrease of 53 per cent.

There was an aggregate gain for the year in all classes of motor vehicles for the respective periods of $3,546,687, although the actual numbers of cars exported was less by 3113. These figures reflect the greater value of motor trucks as compared with passenger cars.

While individuals in foreign countries are attracted by the low prices of American passenger cars as compared with European machines, the foreign governments have sought the best and highest priced American-made trucks.

MOTOR TRUCK CLUB AMENDS BY-LAWS

The following amendment to the By-Laws was unanimously recommended at the regular monthly meeting of the Motor Truck Club of America on February 17th:

"Resolved that Article I, Section 2, of the By-Laws, be amended by striking out the words "Dues shall be payable in advance on January 2nd of each year. The Board of Directors shall have power to adjust the dues of applicants joining the Association at dates not coincident with the beginning of the fiscal year," and substituting in their place instead the following: "Dues shall be payable annually in advance on the anniversary of the date the first dues were paid."

THE AUTOCAR COMPANY REDUCES THE PRICE OF ITS TRUCKS

Of more than ordinary interest is the announcement by the Autocar Company, Ardmore, Pa., of a reduction in price of the Autocar commercial car. During the past year, notwithstanding industrial depression due to the war, the Autocar Company has made the greatest advances in its history, until now more than 2400 merchants and manufacturers and transportation companies, large and small, are using the Autocar.

In announcing a reduction of chassis price from $1850 to $1650, the Autocar Company states that the volume of business done by the company during the past year has been so satisfactory and the demand upon the factory for a further increase of production, by the branch managers, has been such as to require a much larger output during the coming year. This increase in volume of business means a decrease in the expense of production and distribution, and therefore, in line with the policy of the Autocar Company, they have seen fit to give the purchaser the benefit of this decreased cost in the decreased chassis price.

TRUCK TIRES PROFITABLE FOR THE DEALER

To the Editor:

Tire dealers everywhere are now wide-awake to the substantial possibilities that lie in the handling of truck tires. The truck has "arrived," just as the pleasure type automobile "arrived" a few years ago, and the dealers everywhere are equipping to give truck accessories a distribution worthy of the industry.

Up to a year ago truck tires were regarded by the average dealer as a "necessary evil," something that concerned him only remotely. It was not readily apparent to him that truck use was becoming so widespread that solid tires would soon become an important and busy line for dealers.

Within the year the whole situation has changed. We find it comparatively easy to close deals with dealers, and the whole truck industry is benefited by the readiness with which tires can now be obtained by users.

In small towns, in the past, truck users have had to buy tires "out of town." This meant delays. By buying his tires at home the truck owner gets service, eliminates costly delays and patronizes a home industry.

The dealer is strengthened by increased sales, and we, as manufacturers, benefit, because we no longer need be retailers in competition with legitimate dealers everywhere.

A truck uses an average of $175 worth of tires a year. A town of ten trucks alone has $1750 of possible solid tire business, and the future of the truck is unlimited. Truck sales multiply every year, and the dealers who are in on the ground floor now will have a big advantage as the business grows.

We are greatly pleased with the progress thus far, and predict that soon truck tires will be sold as universally by dealers as are pneumatics at the present time.

GOODYEAR TIRE & RUBBER CO.,
C. W. MARTIN, Mgr. Truck Tire Dept.
Akron, Ohio.

The CCJ has most advertisers because it gives them biggest returns

Personal Items

A. C. Woodbury has been appointed recorder of the Standards Committee of the S. A. E., and will make his headquarters in Detroit.

J. H. Irwin, manager of the Seattle branch of the Goodyear Tire & Rubber Company for many years, has resigned and has been succeeded by C. C. Miller.

H. H. Brooks, formerly connected with the Herff-Brooks Corporation, Indianapolis, Ind., has resigned to become affiliated with the Pontiac Chassis Company, Pontiac, Mich.

W. A. Schender, formerly assistant purchasing agent of the A. O. Smith Company, Milwaukee, Wis., has taken a similar position with A. J. Lindemann-Hoverson Company.

J. A. Ayers, formerly in charge of the Detroit branch of the General Motor Truck Company, has become assistant sales manager at the factory in Pontiac. The Detroit branch has been discontinued.

L. M. Baker has joined the sales department of the Standard Steel Spring Company, of Corapolis, Pa. Mr. Baker will look after the western business, with offices at 999 Woodward Avenue, Detroit.

A. M. Russell, formerly with the Lippard-Stewart Company, recently joined sales force of the Signal Motor Truck Company as district manager and is now covering the States of Iowa, Illinois and Minnesota.

E. H. Morse, who up to recently conducted a car agency and supply house in Providence, R. I., is now representing Emil Grossman Manufacturing Company, Inc., among the manufacturers in the territory west of Michigan, including Indiana.

Frank A. Witt, formerly a member of the Studebaker and Lozier sales organizations, has been appointed sales representative of the Detroit Motor Car Supply Company, manufacturer of commercial bodies for Fords, and will travel throughout the West and Southwest.

John L. Milton, formerly connected with the Remy Electric Company, Anderson, Ind., has been elected president and general manager of the Motor Ignition and Devices Company, Detroit, recently formed for the purpose of manufacturing ignition apparatus for motor cars and other electrical devices.

Will H. Brown, who has been connected with the commercial car industry for some time, and Frank Wentworth, Boston dealer, have formed the Wentworth-Brown Company for the manufacture of truck bodies on a large scale. Two plants, one at Plymouth, N. H., and the other at Dover, have been acquired. The first development is a light delivery body suitable for mounting on Ford chassis. The concern also handles the New England selling agency for the Republic truck.

United States Rubber Company, New York City, elected the following officers for the ensuing year: Samuel P. Colt., president; James B. Ford, vice-president; Lester Leland, vice-president; Elisha S. Williams, vice-president in charge of tire and mechanical department; Raymond B. Price, vice-president in charge of development work; Homer E. Sawyer, vice-president in charge of footwear department; Samuel Morris, secretary; W. G. Parsons, treasurer; E. J. Hathorne, assistant treasurer; John D. Carberry, assistant secretary.

Royal Equipment Company, Bridgeport, Conn., maker of Raybestos brake lining, clutch discs and lining, opened new office at 1613 Dime Bank Bldg., Detroit, Mich., with F. George Walker as manager.

SUMMER MEETING OF THE S. A. E

In our last issue we published details of the summer meeting of the Society of Automobile Engineers at Detroit, June 14-17, 1915, on board the S. S. Noronic. Since this announcement, it has been decided to charter, in addition, a smaller boat, the S. S. Waubic to make that part of the trip which is through the far famed Thirty Thousand Islands. The entire passage through the islands to Parry Sound will be made in daylight. The business to be transacted at the professional sessions has been arranged as follows:

June 14—Monday afternoon, Standards Committee Meeting; Monday evening, Business and Professional Session.

June 15—Tuesday morning, Professional Session; Tuesday evening, Professional Session.

June 16—Wednesday evening, Professional Session.

June 17—Thursday morning, Professional Session.

S. A. E. STANDARDS COMMITTEE MEETING TO BE HELD APRIL 22

The spring meeting of the Standards Committee of the Society of Automobile Engineers will be held in the newly established office in the Boyer Building, Detroit, Mich., on Thursday, April 22d, at 10 a. m. Meetings of some of the divisions will be held in Detroit on the same day and a few days prior thereto. Among the subjects which will probably be discussed will be:

Curves and tables of physical properties of S. A. E. alloy steels.
Uniform license pads and mounting of same.
Speedometer-drive shaft-ends.
Exhaust manifold outlet for hot-air carburetor connection.
Dimensions of piston ring grooves.
Distance between cylinder boss and center of side-outlet carburetor.
Speed and mileage rating of electric vehicles.
Motor voltage of electric vehicles.
Efficiency test of solid tires.
Number of cells in standard battery vehicle equipment.
Flat fan belt widths.
Rubber hose and hose clamps for cooling systems.
Cotter pin sizes.
Nomenclature of cantilever springs.
Test of parallelism of eyes and master leaf of leaf springs.
Modification of eye and bolt tolerance for leaf springs.
Frame brackets for leaf springs.
Offset of center bolts of leaf springs.
Nuts for spring clips of leaf springs.
Modification of center bolt standard for leaf springs.
Width of springs for pleasure and commercial cars.
Center bolt nuts of leaf springs.
Length, opening, etc., of spring clips of leaf springs.
Spacing of clips.
Pressure blocks.
Length of spring seat.
Material between spring and spring seat.
Concavity of leaf spring material.
Standard inspection methods and physical tests of leaf springs
Standard tolerances as to height and load of completed spring.

Gramm-Bernstein Company, Lima, Ohio, announced that it has closed contracts in England for a minimum number of sixty trucks per month running through a year. Its domestic business has been growing so rapidly since the 1st of January that it has built an addition 47x185 ft. and is now erecting another one.

A Get-together dinner between the members of the working force and the superintendents of the Thos. B. Jeffery Company, of Kenosha, Wis., was given on March 14th at the Elks Club, and the evening was a most enjoyable one. It was given with a view to having a better understanding of the plans of the future.

Changes and Factory News

Firestone Tire & Rubber Company is erecting three-story and basement building 38x140 ft. in Omaha, Neb.

Warner Gear Company, Munice, Ind., has moved its Detroit branch office from the Ford Building to 967 Woodward Avenue.

Commerce Motor Car Company, truck manufacturers, leased building at 1765 East Eighteenth Street, Cleveland, Ohio.

Parish & Bingham Company, manufacturer of pressed steel frames, moved its offices to 10615 Madison Avenue, Cleveland, Ohio.

Shurgas Injector Company, formerly of Detroit, has been bought out by the Pontiac Motor Castings Company, of Pontiac, who will manufacture that line in Pontiac in future.

Connecticut Telephone & Electric Company, Meriden, Conn., is erecting a four-story and basement addition approximately 50x100 ft. It will be largely devoted to the manufacture of Connecticut automatic igniter systems.

Atwater Kent Manufacturing Works, Philadelphia, Pa., shipped during February of this year 100 per cent. more ignition systems than during the corresponding month of last year, and fourteen times more than in February, 1913.

Stegeman Motor Car Company, Milwaukee, Wis., has reduced the prices on some of its trucks as follows: One and a half ton truck from $2100 to $1900; two and a half ton from $2800 to $2500; three and a half ton from $3350 to $3000.

Swinehart Tire & Rubber Company, Akron, Ohio, is erecting three-story addition 100x120 ft. One floor of the new building will be used by the office force and the other floors and basement for manufacturing purposes. The company will, by this new addition, be enabled to triple its output.

Roberts Motor Company, Sandusky, Ohio, has been reorganized under the name of the Roberts Motor Manufacturing Company, Incorporated. New capital has been put into the business, which will enable the company to work on a broader basis than heretofore. Automobile, aeroplane, marine and stationary motors are manufactured.

Detroit Foundry Company, Fordyce and Marston Avenue and Morrow Street, Detroit, Mich., suffered loss of $75,000 from fire on March 12th, but the company's business will not be very strongly affected, as the production facilities of its plant on Hastings Street will be increased to take care of the business for the two plants. Rebuilding the burned property will be started as soon as possible.

Park Drop Forging Company, Cleveland, Ohio, manufacturer of crankshafts, heavy die forgings, etc., is building an addition of 80 ft. to its present plant. This is the third addition in the last 3 years. All the buildings are fireproof and cover over 55,000 sq. ft. At the present time, the company is operating thirty-nine modern hammers and hydraulic presses. In the heat treatment department there are sixteen large furnaces, and two additional ones are being installed.

Detroit Frersed Steel Company, manufacturer of Fenestra solid steel windows and automobile springs, has increased its capital stock from $500,000 to $1,250,000. Of this sum, $500,000 is in common stock and $250,000 in preferred, the latter coming in the form of a 50 per cent. stock dividend. Two additions have been made to the plant since January, and an addition to the general offices is now under construction. Orders during March exceeded those of any corresponding month in the history of the company. The plant is working 24 hours per day to keep up with the orders.

The CCJ has most readers because it gives most information

RITTMAN PROCESS OF REFINING GASOLINE FROM PETROLEUM CAN BE USED BY ANYONE; GIVES TWO HUNDRED PER CENT MORE GASOLINE

The recent announcement in the public press of the discoveries of Dr. Walter F. Rittman, chemical engineer of the Bureau of Mines, which makes possible a yield of gasoline 200 per cent. greater than any known process, has created much interest among the automobile as well as the oil men. It is claimed the process is better than the Burton, which is controlled by the Standard Oil Company, and does not infringe the patents on same. It makes possible the manufacture of gasoline from low grade oils and also the manufacture at low cost of toluol and benzol substances used in the manufacture of explosives, and in dyeing.

Dr. Rittman does not claim to have cheapened the cost of making gasoline or the other products which can be made by his method, but claims that he has broadened the source, as cheaper oils selling as low as 3 cents a gallon can be transformed into more valuable products. His process can be made continuous by feeding the oil under pressure so that it is entirely different from the Burton system, which is essentially a batch process.

His process, in brief, consists not in heating a large body of liquid and distilling the same over with consequent danger of explosion, but feeding a very small portion of the liquid petroleum into the still from a main tank. The vapor of this is then distilled. He claims that the application of heat to the vapor is much more definite and the results can be gaged more accurately than applying heat to a mixture of vapor and liquid.

The patents covering the new process are the property of the government, and are, therefore, available to any manufacturer desiring to make use of them. There will, however, it is said, be certain restrictions or regulations which will be insisted upon by the government for those who use the process. It is said that several large companies are already preparing to make use of it.

The practicability of the Rittman process has been questioned by Benjamin F. Brooks, of the Department of Chemical Engineering, of the University of Pittsburgh, when applied on a commercial scale, and he points out that Dr. Rittman has not yet proved that his methods are practical except in the laboratory.

Dr. Rittman claims that although the process has not yet been tested on a commercial scale, that every step has been carefully checked, and that it is scientifically safe to say that the process of producing gasoline from petroleum has been revolutionized.

The McGraw Tire & Rubber Company, East Palestine, Ohio, has declared the regular quarterly dividend of 1¾ per cent. on its preferred stock, payable April 1st to stockholders of record March 20th.

Case, J. I., Threshing Machine Company, Racine, Wis., in its annual report for the 12 months ending December 31, 1914, shows net profits of $966,698, equal to 7.95 per cent. on the $12,150,000 preferred stock.

AUTOMOBILE TRAINS AT THE EXPOSITION

By C. P. KANE

Viewed from outside the entrance gates a popular vote would undoubtedly select the Tower of Jewels as the chief attraction of the Panama-Pacific International Exposition. Inside the accurately clicking turnstiles there is nothing which so quickly catches and holds the eye as the spic and span white auto trains that are quickly skimming about the beautiful Jewel City, conveying thousands of visitors over the extensive grounds, affording the former a complete and comprehensive view of the great fair in its exterior aspect which they could not otherwise obtain.

The Fadgl Auto Train is the name under which this wheeled fleet operates. Its popularity cannot be questioned, for every train is loaded to capacity. It is a midget train by comparison, but a big thing from the standpoint of its commercial success.

A Californian, R. B. Fadgl, invented it. He is a well-known Oakland automobile dealer. It was while in Philadelphia on a business trip 3 years ago that the idea had its birth.

Being of an inventive and practical turn of mind, Fadgl set about putting into concrete form something to meet this need. The motive power was simple enough, but a passenger coach combining comfort and practicability, a mechanical complement to the engine, gave Fadgl a pretty problem.

Followed a few weeks of the transformation of theories to blueprints and blueprints to models, until at last Fadgl produced a four-wheel trailer, incorporated in which was a clever intersteering device made up of diagonal steering arms.

In detail each train consists of a special miniature Auto Tractor of 36-in. tread, with 25x5 in. solid tires, and two specially designed trailers or cars resembling a double settee, with the conductor's aisle in the center.

The braking system consists of a shoe connected midway in the draw-bar, which is forced downward when the motion of the train is slackened, the action being automatic and in unison with the tractor, making it absolutely safe in crowds. The system is an entirely new invention, which successfully solves a hitherto perplexing problem.

The whole car is but one step off the ground, running on four invisible wheels, all controlled by a draw-bar connection to the tractor in such a way that the two cars follow in exactly the same tracks as the tractor when rounding a turn in the road. This feature eliminates any cutting off on turns or crowding of people off the road. Each train seats forty people comfortably, and the cars are most convenient in getting on or off.

The twenty Fadgl auto trains are operated in a manner which is similar to that of a street car system. A similar chart is used and similar schedule system. This similarity of operation is carried out in all its details.

FIVE-TON KISSELKAR NOT A STANDARD MODEL

The description of a new five-ton KisselKar truck, on page 39 of our March issue, is misleading, as the five-ton model described is spoken of as an addition to the KisselKar line. We are informed that this is a special model built for the Boston branch and is not a regular addition to the line.

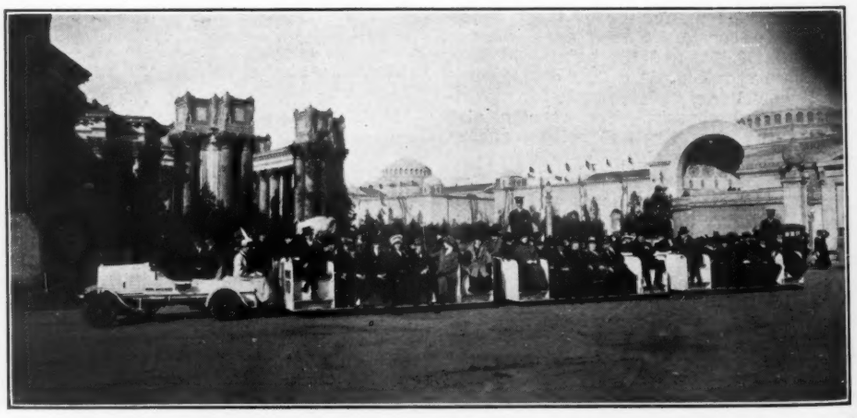
DETROIT POST OFFICE DESIRES BIDS ON MAIL-CARRYING

Postmaster William J. Nagle, of Detroit, Mich., desires bids on the conveying of mail from the main post office, the branch post offices, and the railroad depots of that city, for a period of 4 years, beginning July 1, 1915, and ending June 30, 1919.

Thirteen gasoline or electric automobiles will be required as follows: one three-ton, five one and a half tons, and seven one-ton

He also desires to receive bids on the furnishing and maintenance of twelve 750 lbs. capacity vehicles, to be used in the collection and delivery of mail in Detroit for a period of 4 years, beginning July 1, 1915, and ending June 30, 1919.

Further particulars will be furnished by him upon request.



Novel Use of Automobiles at the Panama-Pacific International Exposition

This illustration shows a most unique adaptation of the automobile at the International Exposition. It is known as the Fadgl Auto Train, which has a seating capacity of about sixty-five passengers, and carries two conductors. This train makes it easy for sightseers to get from point to point in the enormous grounds.

The CCJ brings greatest returns to advertisers because of largest circulation among quantity buyers

THE JITNEY NOT A SUCCESS IN CHICAGO

WHETHER it will be the so-called "Jitney" or other types of motor vehicles which can run here, there and everywhere on the pavement and pay dividends on only a five cent fare remains to be seen. At all events, nothing has been done in Chicago except that a few touring cars are used by individuals.

The Bankers' Special

In Oak Park, north of Chicago and a separate corporation, a "Jitney-'bus" went into operation for a few days, but the projector claiming that he could not make money for a five cent fare unless over 225 passengers were carried daily, he advanced the fare to 25 cents, and the "Jitney" was renamed the "bankers' special."

A 'Bus Line With Tickets

A Woods Electric, equipped with a 'bus body having seats for six inside and two more on the driver's seat, is operated by the Fashion Electric Garage, between points about one mile apart for a five cent fare. Upon request, and with another nickel, the driver will give an additional mile. The owner seems satisfied. He finds it helpful to bring patrons to and from their homes

PHOTO BY COURTESY OF CHICAGO AMERICAN

Electric 'Bus in Chicago
The first electric used for carrying passengers for a ten-cent fare

for their electric cars stored in his garage. That is probably where the dividends are, as he issues them tickets.

The Chicago Motor 'Bus Company is expected to begin operations very soon with fifty motor 'buses. If opportunity offers anywhere for a motor-'bus line for five cent fare to operate at a profit, conditions in Chicago, with its level streets, reasonably good pavement, dense population, and an absolute necessity for relief from the present situation should offer an inviting field, but indications point to the five cent 'bus as a failure.

The "jitney" competition means, however, the loss of thousands of nickels in cash fares, which will force traction companies to give the public better service.

Republic Motor Truck Company, Alma, Mich., has secured the largest single order for trucks that it has ever received. This order calls for three hundred trucks to be delivered during 1915, and was placed by the Anglo-American Export Company, of London, Eng.

HAIL! THE JITNEY 'BUS

To the Editor:

Sweeping the country from Phoenix to Detroit, and from Los Angeles to New York City, comes the jitney 'bus. It is engulfing cities, large and small.

Jitney is a term of Russian, Japanese, or sporting circle origin, and a jitney 'bus is any automobile or motor truck which is used to haul passengers at a per capita charge of one jitney—five cents. It is usually equipped with large side seats and ample step surface to facilitate loading.

From the way in which the jitney 'bus has taken hold, there is nothing to indicate that it is a fad. The question is, can it be made to pay at five cents a passenger?

Phoenix, Arizona, where the idea is supposed to have originated a year ago, now has a dozen jitneys, although it has but 12,000 population. The jitney takes hold with earnestness wherever it starts. One man, as quoted in The Digest, sees in the future—"An automobile express consisting of cars built especially for city passenger traffic with a capacity of ten or a dozen persons, each operating on regular routes with branch lines and transfer stations."

The way the jitney 'bus takes a city by storm is illustrated by the experience of Kansas City. Within a week after that city had started its first jitney, it is said to have had eighty cars in operation, and within 2 weeks 150. Extra policemen are needed to handle the crowds at the central downtown jitney station.

There are seen many reasons why the jitney 'bus is needed. In no city of any size have the street railway systems been able to handle the traffic during the rush hours without congestion and crowding. An army of jitneys is like a relief corps which can swoop down upon the overcrowded corners and carry away the surplusage.

Furthermore, they are ideal for sections of a city which are not penetrated by car lines, or residence districts which will not be invaded by noise producing systems. It is impossible to tie up the whole system. One jitney may break down, but the hundreds of others go on their way just the same.

As investors the country over venture into the operation of jitney 'buses, they must discover by experimentation the kind of car best suited to the business. At the present time every possible variety of pleasure craft and commercial cars is being used. Time will tell what style and class is best adapted. "At present," as the head of the motor truck department of a large manufacturer recently said, "it looks as if the ultimate solution would be a light, strong car of moderate cost and capable of carrying eleven or twelve passengers. The difference which arises between solid and pneumatic tires may mean the difference between profit and loss. Pneumatic tires will enjoy long life on asphalt streets, but when the routes call the jitneys away from the boulevards, solid tires doubtless will be necessary if passengers are to be carried with profit at jitney fare."

GEORGE F. WHITSETT,
International Harvester Company of America.

Thos. B. Jeffery Company, Kenosha, Wis., received an order from the French government for 750 three-quarter-ton trucks. This contract involves $1,000,000 and was secured by H. C. Hill, who went to Paris several months ago to seek war business for the Jeffery Company. Several hundred more men have been employed, and it is the intention of the company to reach a daily production of thirty cars on this order alone.

JITNEY PACKAGE DELIVERY IN KANSAS CITY

On March 2, 1915, the first jitney package delivery service was established in Kansas City by the firm of Doehler & Stamp, the firm owning one car and managing the schedules and maintaining the headquarters for six other car owners. The office is at 541 Walnut Street, where Mr. M. Doehler has a cigar store, and has for many years operated a paper route for the Kansas City Star. Mr. Stamp is a produce man.

The service now consists of seven cars—five-passenger cars of the Reo and Ford makes, and two 'buses of the Studebaker variety already in use in Kansas City for the "uptown" passenger business. The managers receive from the associated owners 25 per cent. of the collections for package deliveries; the passenger collections are wholly the property of the associated jitney drivers. The new association has established districts rather than routes to be served, and cars go into these districts every hour. The firm guarantees that packages will be delivered within an hour. Plans are now being made to put truck bodies on the Studebaker chassis of the two large cars for carrying passengers only.

The headquarters are close to the city market, in the midst of the produce business, and it is expected that the largest part of the service will be in the delivery of food supplies. The goods may be delivered by the purchaser at the jitney station, and there will be collected by the drivers serving the various districts.

CALL FOR NATIONAL JITNEY MEETING AT KANSAS CITY

The Kansas City Jitney Livery Company, on March 20th, sent out a call throughout the United States for a get-together meeting on May 4th, 5th and 6th, in Kansas City, for an interchange of views on legislation, insurance, safety in operation, licensing of drivers, style of equipment best adapted to the different classes of service, etc., and also with the idea of laying the foundation for a national organization. It is believed that this will strengthen the movement in every way, and make it possible for the operators to combat successfully adverse or unfair legislation and the traction interests.

U. S. L. COMPANY REORGANIZATION NOW ASSURED

United States Light & Heating Company, Buffalo and Niagara Falls, N. Y., which has been working under a receivership for nearly a year, will sell its assets in July, and transfer the business and property to the reorganized company. In the meantime, the business will be conducted without interruption under the same operating management as heretofore, and the prospects for a large volume of business seem unusually bright.

Bessemer Motor Truck Company, Grove City, Pa., has sold forty trucks to the Portugese government.

The CCJ is the only truck journal a member of the Audit Bureau of Circulations—Why?

'Bus Situation in Kansas City

By W. D. MENG

THE jitney automobile passenger service, as it is now conducted in the cities where the scheme is being tried out, is not apt to become permanently established, but will bring about the introduction of a 5-cent omnibus system, immense in proportions, according to the conclusions reached by one of the men most closely identified with the development of the jitney business in Kansas City.

E. K. Carnes, traffic manager of the Central Association of Jitney Owners in Kansas City, makes the statement, "that the jitneys have created a new opening for the truck manufacturers."

Mr. Carnes is one of the men who looks forward to a time when trolley poles and trolley wires will be pulled down, and when street cars will be replaced by large passenger motor vehicles, perhaps electrically driven 'buses.

New jitney 'buses, carrying from ten to twenty passengers, are being put into service almost daily in Kansas City. Twelve will be put on the streets during the first half of March. At the beginning of March there were twenty-one 'buses in operation. About half of these are built upon the chasses of touring cars. Two were formerly used as moving vans. Two or three are home-made affairs, with 2x4 framework and canvas tops. The others are trucks fitted with 'bus bodies. A large Pierce-Arrow limousine has been converted into a pay-as-you-enter sixteen-passenger 'bus. The trucks which have been adapted to the service include Studebaker, Willys Utility, Buick, and White models.

Second-Hand Cars First to be Retired

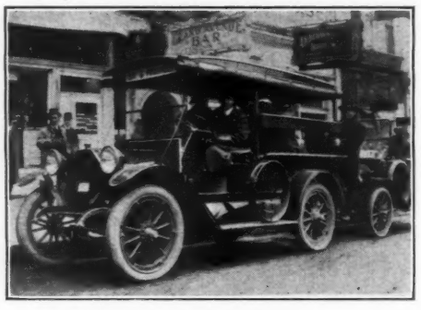
At the same time that the 'buses are being put in operation, the present basis of the jitney business is being demonstrated by the retirement of many of the touring cars. The owners of the small jitney cars are finding the venture not only unprofitable, but in less than 3 months' time their machines are showing so much wear and depreciation that they are no longer dependable for the strenuous jitney service.

Failure has come first to the owners whose machines were old and in doubtful repair to begin with. The dealers in used cars have profited considerably, since there was a rush of buyers willing to take a chance; but it is the used second-hand machines which are being retired. But up to date there have been more than enough applicants to fill the vacancies. Twice as many jitneys were registered at the beginning of March as at the beginning of February, and this despite the fact that many of the owners who were earliest to enter the business have dropped out. Some jitneys are trying the experiment of charging 10-cent fares, and fourteen or fifteen drivers are working independently of the association.

Two hundred and forty-three machines, including twenty-one 'buses, were running at the beginning of March. A better class of cars, mostly new or little used models, has been obtained in the last month by subjecting the cars of all applicants to examinations, something which was not done at the start. The association now employs an expert for that purpose.

The automobile dealers are sceptical as to the future of the business. According to the best estimates of earnings available at the jitney association headquarters, the owners are making it pay, but this does not convince the motor dealers.

"Although there may be some profit now," as one dealer put it, "at the end of 6 months the man with a touring-car jitney will find that he needs new tires; he may have had mostly breakdowns if he doesn't own a first car, and the wear and tear on his machine must be counted. How will he pay these costs? He isn't considering them when he says he is earning a profit of $3 or $4; and not many small cars will do as well as that. They must make too many trips for 5 or 10 cents, or nothing."



A Studebaker Truck Adapted to Jitney Service in Kansas City

Equal to the feeling among the dealers that the jitney business cannot exist long in its present status is the confidence in some offices that it is by no means a transient fad. While a few dealers believe that the business will never assume important proportions, and that the popularity of the jitney will soon pass, there are others who accept it as the beginning of a transportation business as great almost as traffic manager Carnes foresees.

Willys Utility Jitney

An instance of this confidence is to be found in the expenditure of $1000 by the Overland Automobile Company through its Kansas City office for equipping the most complete and up-to-date jitney 'bus in Kansas City. That sum is being spent in building a 'bus body on the chassis of a Willys Utility truck, which will have a capacity of twenty passengers. It will be electric lighted, heated, and furnished with signal buttons. The car will be more attractively upholstered and more comfortable than any 'bus now in use.

"We thoroughly believe that the jitney business will have a big future, but not as it is now conducted," said an Overland official. "We are putting good money back of our confidence for its growth and permanence, too. As a matter of fact, the jitneys have opened up an entirely new field for the automobile men, and the possibilities are immense.

"It is not only in the cities that jitney 'buses are going to be operated. Every small town will have its jitneys, and there is every reason to believe that the jitney will find a permanent place in the country towns sooner than in the cities. Only today an order for three fully equipped jitney 'buses was placed with the Overland Company by a man who is establishing a jitney service in his town, and that is only one instance. The towns throughout Missouri and Kansas are doing the same thing. The automobile companies are slow to realize what this means to them."

Between now and summer the association expects to begin the construction of a $100,000 garage and a central station for receiving and discharging passengers. Tentative plans for these two projects are under consideration.

CHICAGO CONSIDERING MUNICIPAL 'BUSES

As a possible solution of the old problem of inadequate street railway service and the intolerable overcrowded condition of the surface and elevated lines, the Chicago Board of Aldermen has been considering for some time the possibilities of the motor omnibus. Despite the opposition of the street railway company and certain other interests, it has been proposed to establish a system of motor 'buses to be owned and operated by the city.

The Commissioner of Public Service has made a preliminary report to the city council favoring the project and designating twelve suitable routes, together with estimates of the number of 'buses needed and the cost of installation.

If the city decides to adopt motor 'buses, it will use for the purpose a fund of $3,000,000 derived from the city's share of the earnings of the traction companies.

In his report, Montague Ferry, Commissioner of Public Service, says:

"London, Berlin, Paris, New York City, Pittsburgh, Los Angeles, San Francisco, Indianapolis and other cities all have more or less extensive systems of motor 'bus lines that are operating on a profitable basis.

"The flexibility of motor 'bus transportation is one of its points of superiority over the street railway service. Motor 'buses are unhampered by ordinary blockades or 'headway' schedules. Their specialty, in crowded thoroughfares, like those of London, is in threading their way through congested traffic and leaving stalled street cars far in the rear.

"One of the strongest arguments in favor of motor 'buses is that they can be installed at once, while at best and under the most favorable conditions it will take 2 or 3 years before the building of subways can give any relief to the present overcrowding evils.

The CCJ leads in circulation, advertising and prestige

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HAS THE JITNEY COME TO STAY?
What Will Its Effect Be on the Industry?

THE jitney 'bus has swept the country like an epidemic. There must be a reason. The public enjoys riding in automobiles, especially in fair weather, but at any time if the cars can be closed. The price, five cents, is attractive to the public. Whether the operators can survive at this price is another question. We believe as a general rule they cannot, but it will take months before the drivers realize the facts in the case. When these men go out of business, their places will be taken by others. Their second-hand cars will give work to the repairmen, and the second-hand establishments will flourish on resales to others who, not having had the experience, desire to go into the business. The five-cent 'bus business will therefore die very slowly, surviving only under specially favorable conditions.

Some of those who fail will recognize that five cents is not sufficient and that larger seating capacity is desirable. A few of these may re-enter the business with larger vehicles, probably commercial cars fitted with suitable 'bus bodies, seating from ten to fourteen people. In this way the business will be continued, companies formed and the carrying of passengers by motor vehicles become a regulated and established business. This will make the 'bus body business good, and also the sale of light commercial car chassis.

Large and heavy 'buses will also be used by railroads as feeders for interurban lines and for sections where poles, tracks, and other nuisances will not be tolerated. In the meantime the public are more and more being educated to the automobile, and many will be inoculated with the automobile germ, which as it grows and takes possession means future increased sales, and prosperity for the automobile business in general. This extends throughout the entire industry. From the manufacturer and dealer to the parts and tire makers, to the garage and repairmen, all will benefit.

Freight Jitneys

'Bus lines of all kinds are resulting from the jitneys, but not only passenger carrying lines are in evidence, but many of these, especially in the West, have combination 'buses which also carry baggage. Other lines have special trips in which baggage and freight alone are carried. The possibilities of freight haulage by automobile to suburban sections and between small towns, is rapidly being realized by jitney operators on such routes. Even in the cities, parcel delivery service is being established as a result of the jitney lines, so that in the near future it may be expected that a great many freight lines will be a direct development from the introduction of the jitney 'bus.

Adverse Legislation

From all parts of the country come reports of adverse legislation. City councils are the scene of contention, with traction interests on one side and jitney men on the other. Ordinances which would stifle the new business are being introduced, but as a rule amended or rejected in favor of more reasonable regulations. Gradually suitable ordinances will govern jitney activities and matters will adjust themselves as this new form of automobile activity settles down into a business basis.

Jitney Takes on Broader Meaning

The word "jitney," although it means an amount approximating five cents in money, is fast being incorporated into our language, as have many other slang phrases, and will undoubtedly stick, being applied to any kind of a passenger vehicle regardless of the price charged.

With this broader interpretation of the word jitney, we will say that the jitney 'bus has undoubtedly come to stay and that the present epidemic will gradually be brought under control, resulting in a tremendous impetus to the use of motor-driven vehicles for passenger and freight-carrying service throughout the length and breadth of the United States.

INCREASING SALES REPORTED BY TRUCK MAKERS

It is generally conceded that, although the truck industry is rushed to the limit of the capacity of the factories, that most of this is due to war orders.

It is now reported by individual firms, and also by the N. A. C. C., that makers are receiving large orders from American firms. A recent report of the directors of the N. A. C. C. states that the figures for the first three months of 1915 will be record breaking, and that this applies not only to trucks, but also to pleasure cars.

There is every indication that, as in the past, the motor truck industry will this year show a decided increase over that of last year. This has been the history of the industry since its inception, regardless of financial crises, panics or business conditions in general.

NEW REFINING PROCESS QUESTIONED

The announcement of Dr. Walter F. Rittman, of the Bureau of Mines, that he has discovered a process by which 200 per cent. more gasoline can be refined from petroleum than by any known process, has created considerable interest in view of the possibilities held out of increasing the total production of gasoline.

The CCJ has most advertisers because it gives them biggest returns

His process has not yet been demonstrated commercially, but is based on very careful laboratory results extending over eight years.

Dr. Rittman has been severely criticised by certain chemists on the ground that the matter was made public through the newspapers before any attempts were made to prove that the process was commercially practical.

AUTOMOBILE NOMENCLATURE

The Society of Automobile Engineers at its January meeting accepted the report of the nomenclature division, in which standard names are given to the various parts of automobiles. This is a distinct step in the right direction, and it will be our aim to follow this nomenclature in our reading pages. The most conspicuous standardized word is "engine," to be used instead of "motor." This is adopted because such a large number of automobiles are now fitted with electric starting systems, in which is incorporated an electric motor, and confusion is likely to result from the similarity of terms.

Steel and Rubber Markets

Many New Export Orders for Steel

Export steel orders totaled more than 1,000,000 tons during the first quarter of the year. Domestic business, for actual home consumption, is still falling off. The car shops have made a gain over last quarter of 1914, yet fall far below record of orders booked during first quarter of 1914. The industry is operating between 70 and 75 per cent. total ingot capacity.

Quotations on April 10th were:

STEEL PRODUCTS PRICES

Bessemer steel, per ton, mill	18 00	a19 50
Open hearth, per ton, mill	18 50	a20 00
Sheet bars, per ton	19 50	a21 00
Steel bars, soft base half ex-tidewater	1 31	a ....

The above prices are at tidewater in carloads and larger lots. For quantities less than 2000 lbs., but not under 1000 lbs. $2 per ton additional is charged, and less than 1000 lbs., $8 per ton additional.

SHEETS

The following prices are for 100-bundle lots and over f. o. b. mill; smaller lots $2 per ton higher.

Gage—	Black.	Galvanized.	Gage—	Black.	Galvanized.
Nos. 22 & 24	1 70	2 95	No. 28	1 85	3 40
Nos. 25 & 26	1 75	3 10	No. 29	1 90	3 55
No. 27	1 80	3 25	No. 30	2 00	3 70

IRON AND STEEL AT PITTSBURGH

Bessemer iron	14 40	a 14 50
Bessemer steel, f. o. b. Pittsburgh	19 50	a 20 00
Skelp, grooved steel	1 12½	a 1 15
Skelp, grooved iron	1 50	a .....
Ferro-manganese (80 per cent.), seaboard	78 00	a100 00
Steel melting scrap	12 50	a .....
Steel bars	1 10	a 1 20
Black sheets, 28-gage	1 75	a 1 80
Galvanized sheets, 28-gage	.....	a 3 40
Blue annealed, 10-gage	1 30	a 1 35
Tank plates, ¾ and heavier	1 10	a 1 20

Crude Rubber Inactive

Since our last report no material changes have been noted in the rubber situation, the price of Para hovering between 57 and 59 cents. The manufacturers are buying in small lots only just enough for current requirements.

Quotations on April 10th were:

Up-River—			
Fine	59	a	60
Coarse	47	a	48
Island—			
Fine	54	a	55
Coarse	34	a	35
Cameta	36	a	38
Caucho Ball—			
Upper	49	a	50
Lower	Nominal		
Centrals—			
Corinto	45	a	..
Esmeralda	45	a	46
Guatemala, slabs	42	a	43
Mexican—			
Scrap	43	a	44
Strips and scrap	43	a	..
Guayule	..	a	..
Balata—			
Sheet	53	a	56
Ciudad—			
B'k	..	a	..
Trinidad—			
B'k	Nominal		
Africans—			
Massai, red	..	a	..
Red C'go	Nominal		
B'k C'go	..	a	..
Soudan—			
Niggers	Nominal		
Gambia, prime	..	a	..
East India—			
Smk, sh'ts	66	a	68
Ceylon—			
Bis & sheets	64	a	66
Pale crepe	65	a	67
Pontianac—			
P'me plantation	..	a	..
Palembang	..	a	..

DOMESTIC SCRAP RUBBER

Tires—			
Automobile	4¾	a	...
Bicycle, pneumatic	3	a	3¼
Wagon and carriage, solid	4½	a	...
Inner tube	12	a	14

LEGISLATION OUTRUNS THE JITNEY

As the jitney 'bus movement swept eastward across the country from the Pacific coast during the last 6 months, it reached the Atlantic seaboard in Boston about the end of March only to find that it had lost the transcontinental race to the flood of city ordinances and legislative bills that had been running neck and neck with it all the way.

In January a bill was introduced in the Massachusetts legislature imposing such high license fees and providing such other onerous conditions as would make it impossible to operate jitney 'bus lines with profit. There was nothing novel about the bill except that it anticipated, by about 3 months, the arrival of the first 'bus lines that it was intended to regulate, ostensibly for the good of the public. Like similar bills and proposed ordinances elsewhere, it was so transparent that the legislators readily saw the motive behind it and failed to approve it.

The jitney 'bus question is likely to regulate itself in a short time, in the opinion of the National Automobile Chamber of Commerce, without any attention from legislators and city councilmen, if given a chance. The eagerness with which the public has taken to riding in the 'buses shows that they fill a need in local transportation. Patient citizens long ago grew weary of strap-hanging, and will not see promised relief snatched from them without a protest.

In the larger cities the 'bus owners are forming associations to control the operation of the machine and afford necessary protection to passengers and to other users of the streets. Wherever street car service is adequate the transportation companies need not fear competition of the motor 'buses.

Eventually, the jitney will be succeeded by especially built motor omnibuses, like those operating in the largest European and American cities. Their real function will be to supplement the street car service, which is insufficient in most large cities, and to this end the public will demand that their development along proper lines be not discouraged.

A. O. Smith Company, Milwaukee, Wis., maker of pressed steel frames and parts, is again working at full capacity. The number of employees is over 1200.

NEW BATTERY-SERVICE SYSTEM

Geo. Drake Smith, agency supervisor for the General Vehicle Company, Inc., of Long Island City, N. Y., manufacturers of electrical vehicles, has just concluded a long term agreement between his company and the Pacific Gas & Electric Company, of San Francisco, whereby the latter will give to purchasers of General Vehicle Company's chasses complete battery service system. By this system the commercial car user purchases the bare chassis with its engine and connections, which does not include the batteries. The Pacific Gas & Electric Company supply the batteries and garage the truck, and give complete service to the user, including current, washing, inspection, oiling and housing the truck. The batteries and service are furnished at so much per mile, so that the owner has no guesswork as to cost of operating his truck. The batteries can be replaced in 5 minutes' time, and thus the truck can be kept in continuous operation 24 hours in the day if needed. The General Vehicle Company, Inc., will carry a full and complete stock of repair parts to supply coast customers.

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Motor 'Bus Business Growing Rapidly—Due to the Jitney Agitation

Few Five-Cent Lines Making Money But Are Leading to Tremendous 'Bus Boom

By E. S. FOLJAMBE

MORE passengers than freight have doubtless been carried by automobiles, yet the use of public passenger-carrying automobiles is comparatively new in this country. The sudden and rocket-like rise into prominence of the "jitney 'bus," however, has brought the passenger-carrying automobile for public service and for hire, not only into prominence, but into,—permanence. Do not misunderstand my meaning; I do not believe in the jitney 'bus as a permanent institution if jitney 'bus is confined strictly to its legitimate meaning, that is a vehicle hauling passengers for a 5-cent fare, but I do believe that the jitney 'bus is the forerunner of a vast army of passenger-carrying vehicles of 'bus type which will eventually be used in this country. The wrecks of the jitney 'bus proper, that is the 5-cent 'bus, will be the foundation from which a permanent 'bus business with a higher fare will eventually be established. There may of course be exceptions; there may be short hauls over very smooth pavements in congested districts where large numbers of passengers can be taken on and discharged within a few blocks in which the 5-cent 'bus will make good, but these cases will be so few and far between as not to be considered, but the future of the 'bus business is now assured.

The public of the United States has been stirred as nothing else could have stirred it to look into the possibilities of motor-driven 'buses for transportation, by the sudden advent of the "jitney" in nearly every large city, and even some of the small ones throughout the country.

Although Europe has been far ahead of us in the use of trucks, and especially 'buses she has gradually dropped behind. The following is a paragraph quoted from a foreign correspondent of this JOURNAL in answer to a letter in which I expressed surprise that more dumping bodies were not used in England.

"I do not wonder at your surprise concerning what I say about the few tipping bodies in use here. In every branch of the commercial car business we had the start of you, but partly owing to the conservatism of the business men and the short-sighted policy of our manufacturers, I am afraid you are already streets ahead in the use of trucks, and unless we are careful you will pass us in the use of the business passenger car."

Manufacturers of light chassis in all sections are following up the stimulus imparted by the jitney 'bus business, while many makers of heavier chassis are selling their product for large 'buses. Body makers are also busy. Although the strictly 5-cent 'bus will probably die out and pass away in most places, yet the name jitney is very likely to remain and be applied to any automobile regardless of the price charged as fare. Permanent 'bus lines as feeders to railway lines, as inter-urban transfer lines, and lines which will take in broken up sections where it would not be profitable to lay permanent tracks are sure to follow as a natural development. As a means of opening up connections with new districts motor 'buses are unexcelled, as they provide an economical method as compared with the cheapest possible form of car running on rails, if the cost of the roadway is taken into consideration. There are many traction lines where

Proposed New York 'Buses to Have Women Conductors

The illustration shows a new 'bus owned by the People's Five Cent 'Bus Corporation, of New York, which wants to take over all routes of the Fifth Avenue line, and to start new ones on Broadway and between railway stations. The "Jitney" 'buses of the proposed new line will all be "manned" by women as conductors. They are pay-as-you-enter 'buses, and the "no seat no fare" rule will prevail. The company agrees to pay to the city two and a half per cent of its gross receipts, the franchises to be for a term of twenty-five or fifty years.

Autocar 'Bus Used to Carry School Children, and a Hotel 'Bus

The Autocar at the left is used by the Lower Merion school district, in the suburbs of Philadelphia, for carrying to their respective schools, those children who live at a distance. The other illustration is that of an Autocar used by the Hotel Chelsea, Atlantic City, N. J., and is of the same type as put out by the Autocar Company for station work.

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extensions cannot be made owing to property owners, municipal regulations, prohibitive cost of construction, etc. The patrons of these lines are building further and further from the centers and must be served. This can best be done by motor 'buses, and traction companies as well as individuals, will eventually use this means. In Utica, N. Y., there is a motor 'bus operating in connection with the local street car service between Oneida Square and Sanquoit and in several other places 'buses are used by the traction companies. Cost is perhaps the chief item in the promotion of any proposed traction law. Here the 'buses have an advantage for it is found that a line can be established and maintained at about one-fifth the cost of the ordinary interurban traction lines and started at once. The possibilities are now being considered by the city of Chicago to relieve the present congestion as subways would require several years to build.

The possibilities of freight service are also to be considered, and 'bus lines of the far West and even some of the East have cars fitted with bodies suitable for carrying freight as well as passengers. It is but a step to freight lines competing with the rail roads in interurban and suburban sections, but this is a development which diverts from the subject and must be taken up at some other time.

Conditions Different Here Than in London

Many point to the experiences of London, the largest city in the world, as a sure indication of what is going to happen in the near future in this country; but it must be remembered that it does not necessarily follow, as conditions in London have always been and are now very much different from what they are in New York City or Chicago, or other of our large cities. London has always been more or less dependent upon surface 'buses, and never had, in any stage of its growth, as efficient surface traction lines as are common in this country. The average fare in London is even less than 5 cents. In New York City the Fifth Avenue Coach Company has been operating very successfully a large number of passenger 'buses, but not on a 5-cent fare. This company goes on record to the effect that under present conditions they cannot operate successfully on such a low rate, 10 cents being the usual charge.

Referring to the unregulated jitney service now so popular throughout the country. Reports are already coming in that individual operations are beginning to find that their receipts are not sufficient to cover bad breakage and accidents which, unfortunately, have already occurred in consid-

G M C 'Bus Used by Hotel Colorado

erable numbers, and it is more or less the general belief of those in the industry that the 5-cent 'bus proposition will be but short lived. This does not prove, however, that the time will never come when 5-cent lines can be operated, and I will later quote one or two instances of 5-cent fare lines which are even now claiming to be making money.

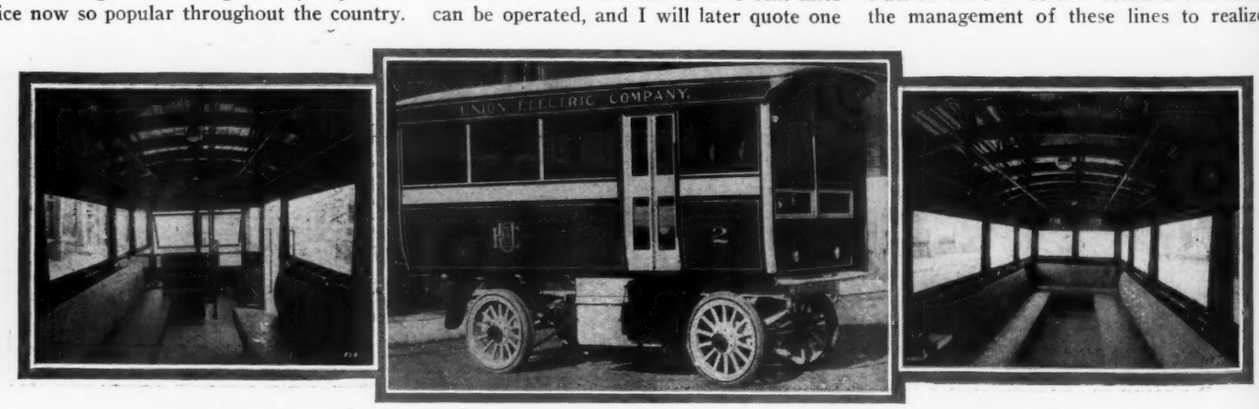
The motor 'bus is immune from many of the troubles inherent with traction lines. Traffic tie-ups can be avoided, and a breakdown does not necessitate the complete stalling of every vehicle behind the one in difficulties. In outlying sections where streets are likely to be muddy, passengers can alight at cross walks and at the curb. The route can be tried without prohibitive expense and more or less cars used as desired. Sudden increases in traffic can be met successfully with motor 'buses. Residential sections in which traction lines could not get a foothold on account of the consequent deterioration of property values can be served by 'buses to the satisfaction of all. Suburban sections can, therefore, be served by 'bus lines as connections of or continuations of trolley lines without unsightly tracks, poles or trolley wires.

A Successful Five-Cent Line

The Union Electric Company 5-cent electric 'bus line, between Dubuque and East Dubuque, Ia., is one which is now, and has been for some time, in operation as a division of the street railway system. The 'buses cover but 3.8 miles per round-trip on a 30-minute schedule, and average 110 miles per day. The vehicles are of General Vehicle Company construction, of Long Island City, N. Y., and seat twenty passengers. The latest 'buses are equipped with a battery of 60 cells Edison, A-10.

The cars have now been in regular service since September 4, 1914, practically 18 hours each day, and without any serious interruption. About the 3rd of February the traction railway system was tied up for most of the day owing to a severe storm, the earnings being but 8 per cent. of normal. During this time the electric 'buses ran with a fair degree of regularity, and earned more than 60 per cent. of their normal showing. In an accompanying illustration one of these 'buses is shown. The cars are being operated by one man supplied with a fare box. Children under six are carried free.

'Bus lines are now being promoted in all parts of the country, and the very fact that the jitney 'buses are causing tremendous and even disastrous competition to the traction lines in certain sections will cause the management of these lines to realize,



Twenty-Passenger G. V. Electrics Employed by Union Electric Company Five-Cent 'Bus Line

These 'buses average 110 miles per day. They cover about 3.8 miles per trip on a 30-minute schedule

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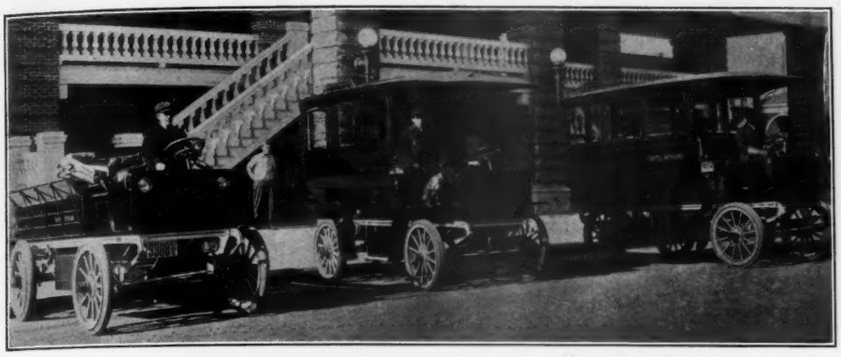


C. T. Electrics Used by Strand Hotel, Atlantic City, N. J.
These cars, it is said, have paid for themselves in the first year and a half of service

as never before, the great passenger-carrying possibilities of motor-driven trucks fitted with 'bus bodies. But these costly experiences for traction companies, as well as individuals, will culminate in many future successful lines.

Motor 'buses, which can be put into operation at short notice, recalled at any time or shipped to other parts of the country, will undoubtedly form the first means of communication and the desired connecting link with more populous centers for many outlying sparsely settled districts without proper transportation facilities.

One case of this kind is the proposed motorway running southwest from Dallas to Forth Worth, Tex. For some 20 miles or more the hard road has already been completed and in operation, and the roadway itself is being extended at the rate of 5 miles a month. This is a corporation road. Toll is charged, and nothing but automobiles are permitted. New sections, it is believed, will thus be brought within reach and settled. A freight service, as well as a passenger line, will probably be installed.

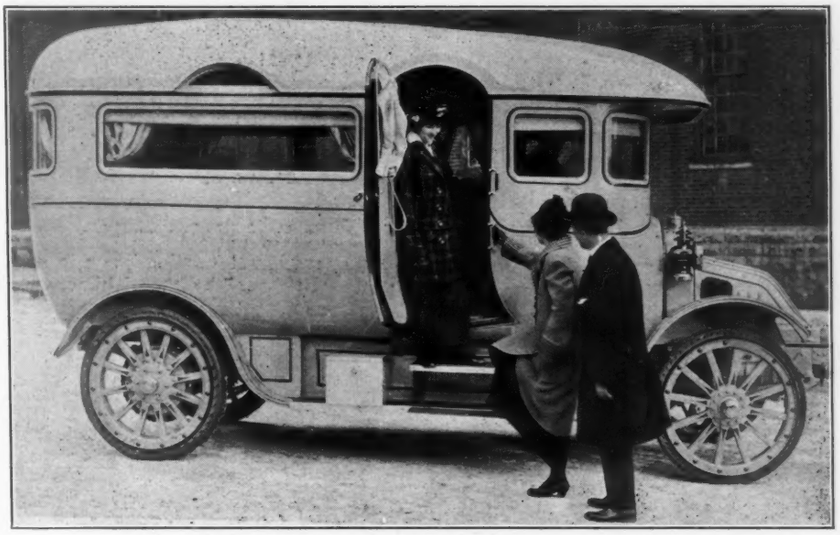
For hotel service, the carrying of patrons from depots to and from the hotel, 'buses are ideal. Their speed, cleanliness and elegance are just the requisites for this business. The bodies are usually enclosed, and vary from a carry-all with roll curtains to the most luxurious limousine.

An Unusual Body

Perhaps the most unusual type of body to be seen on a hotel 'bus is that on a one-ton Kelly chassis in use by the Olympia Hotel, Winnipeg, Manitoba, Canada. As an accompanying illustration shows, the body is of limousine type, and was built by Irvin Robbins & Company, of Indianapolis. It has a seating capacity of fourteen in addition to the driver. The length of the interior is 12 ft., the wheelbase 144 in. the body is of aluminum, finished in French gray. Needless to say the car is fitted with an electric starting and lighting system. It is mounted on Goodyear Motz cushion tires. The interior is finished in smooth upholstery in keeping with the general luxuriousness of the equipment. As shown, a single door admits by two steps to the interior.

The Bond Hill Auto Service Company, Ohio, use a United States truck for a 5-mile round-trip between Bond Hill and Avondale. In February, when the snow was deep, they used the truck as a snow plow, and cleared the road between the two points. Special trips are also made, averaging 20 to 30 miles each. This company has carried, within the last 3 months, 27,000 passengers. The owners were particularly pleased with the fact that the 'bus was able to give satisfactory service when both the street cars and railroads were delayed by the snow.

The Strand Hotel, of Atlantic City, N. J., operates three C. T. electric 'buses to and from the railroad station, charging 25 cents per passenger. The cars, it is said, have paid for themselves in the first year and a half of service. The Brighton Hotel, the New Traymore, and many others in Atlantic City are using 'buses, and this class of 'bus business is growing rapidly.



A Limousine-Type Hotel 'Bus, Showing Distinctive Body Design
Body is mounted on a one-ton Kelly chassis. It seats fourteen in addition to the driver

KisselKar One-Ton Chassis Fitted With a Remodeled 'Bus Body
This illustration shows the "before and after" of an old 'bus body remodeled at an approximate cost of $250. This plainly shows how economically an old rig can be altered to fit a new chassis

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Department Stores Use 'Buses

Not only hotels, but department stores are making use of motor 'buses for the benefit of their patrons. One of the notable examples is the Elliott-Taylor, Wolfenden Company, of Detroit. Round-trips on 15-minute schedule are maintained from the Campus Martius, the main traffic center to their store. The use of the vehicle is free to patrons. The 'bus itself seats twenty-two passengers on long seats on either side of a central aisleway, and the body is mounted on a Packard two-ton chassis. The Styx-Baur & Fuller Drygoods Company, of St. Louis, Mo., also uses a Packard chassis for the same purpose. These 'buses are found very valuable, especially where a store is not located directly on the main car lines.

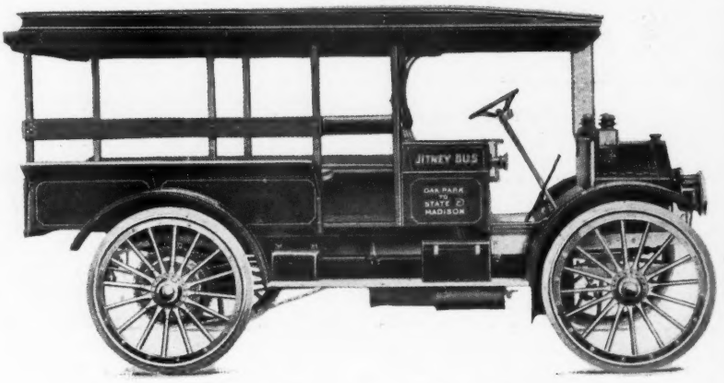
One of the most patronized 'bus lines is that in operation at Belle Isle, Detroit, under the control of Park Commissioner William T. Dust. They operate on a short haul, both winter and summer, and carry a tremendous number of people. The 'buses run between the main line and the island over a park road and bridge, and also on the island itself, where the roads are excellent.

A Washington 'bus line, started in June, 1912, one of the first motor 'bus lines in the State of Washington, is now operating three twenty-passenger, pay-as-you-enter 'buses, which are convertible for either summer or winter use. These cars are in daily operation between Seattle and Bothell. They travel on an average of 240 miles a day, so that the three cars have totaled approximately 88,000 miles since they were put in service.

The White Star Line 'bus, shown in the accompanying page illustration, is an Atterbury two-ton worm-drive model. It holds twenty passengers. This body is a special of touring-car type, with side doors to each seat and a streamline effect. The car is in every sense an elongated touring car. In another illustration is shown a Haverhill rapid transit, thirty-passenger, pay-as-you-enter 'bus mounted on a D-W three-ton worm-driven Atterbury chassis. This is virtually a street car on the road, and has been giving excellent service.

Successful Suburban Line

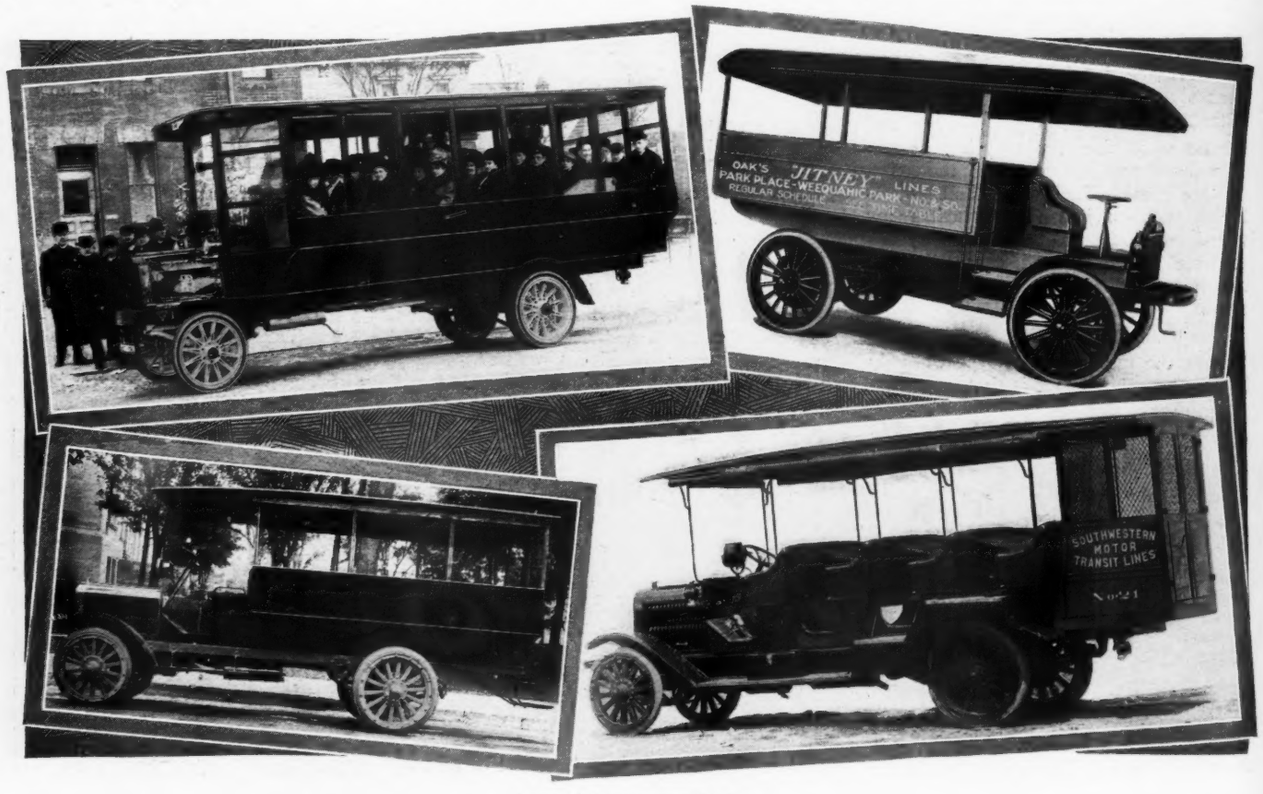
A very successful 'bus line is now in operation at Baltimore by the Baltimore and Lansdowne 'Bus Company. The machines used are Autocars, the line having been started with two 'buses. They have now added a third, and are running three more to take care of rush business. Lansdowne is a suburb of Baltimore, where large numbers of clerks and mechanics reside. The only means of transportation between these points and Baltimore and one or two other small towns en route, is by a spur of the B. & O. Railroad, on which train service is very infrequent, and the trains do not touch all the towns on the route. This 'bus line has filled in the gap, and has been well patronized, the average rate charged being 25 cents per trip.



International Truck Fitted With Special Jitney 'Bus Body

The Syracuse Jitney

In Syracuse, N. Y., John E. Horton is operating a fourteen-passenger Palmer-Moore as a jitney. The line starts from from the center of Syracuse and runs southwesterly to Elmwood, a distance of



Special Passenger Bodies

Upper left, Packard three-ton Detroit municipal 'bus; upper right, new Koehler jitney, entrance at front; lower left, Wisconsin two-ton twenty-passenger; lower right, one and a half ton combination passenger and mail car in use at San Antonio, Texas

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Group of Up-to-Date 'Bus Bodies

Hotels and department stores, municipalities, park commissioners, traction companies and an army of individuals are daily swelling the number of vehicles in use in passenger-carrying. Note elongated touring-car bodies, street-car type, pay-as-you-enter, and jitneys

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2½ miles, making 5 miles to the round-trip, and fourteen round-trips a day schedule is maintained. Mr. Horton has operated 'buses before in connection with summer resorts and is in the habit of changing the 'bus into an express and delivery wagon during off seasons, so that he should be in a position to know whehter it pays him to run the present route. He admits that the line is more or less experimental as a jitney, and that its continuance will depend upon how the returns come in; but he is enthusiastic over the use of passenger 'buses in connection with summer resorts, and has recently ordered an eighteen-passenger Palmer-Moore to take care of his increased business near Otisco Lake.

A twenty-passenger 'bus operating between Helbourn City and Mirror Lake, Wis., during the recent season, showed an earning of $755 more than that earned by the horse-drawn rig used in previous years. This 'bus is shown in an accompanying illustration, and is the Wisconsin Motor Truck Company's chassis, which is of two ton's capacity, and worm driven.

Manufacturers recognizing the growing demand for 'bus bodies, are planning to meet this business. The Studebaker Corporation of America has recently placed on the market a new transportation model, seating fourteen passengers. Entrance and exit are by the front door only on the right side, the door being controlled by a lever in front of the driver who sits on the left. The control levers are at the center as will be seen by a detail photograph of the door, driver's seat, control levers, etc. The windows may be removed for summer driving, and the driver is provided with a clear, rain vision, ventilating windshield. A motor, 3½-in. bore and 5-in. stroke, is employed, and the car is fitted with electric lights and starter. The 'bus is mounted on 35x5-in. pneumatics. The wheelbase is 116 in.

Maker Demonstrates Jitney 'Bus

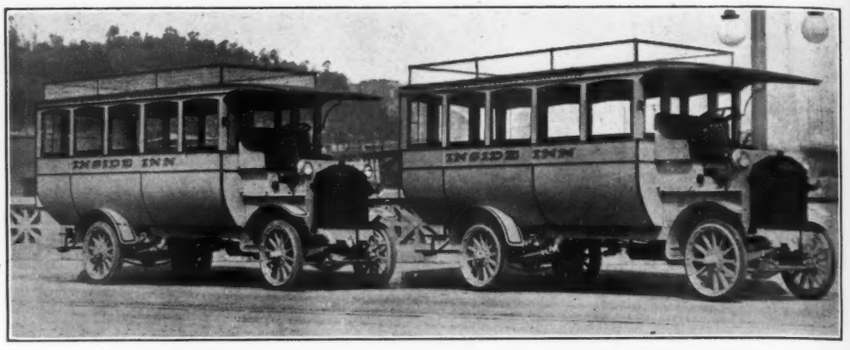
In Newark, N. J., the H. J. Koehler S. G. Company, makers of the Koehler truck, are demonstrating the possibilities of the new Koehler jitney 'bus which seats fourteen passengers and sells for $875, by operating a pay-as-you-enter line between Park Place Depot of the Pennsylvania Tube System and Weequahick Park, which lies about 3½ miles southward toward Elizabeth.

The distance between ends of run being about 3 1/3 miles, it is figured that the heaviest traffic from the depot covers approximately one-third of the way, and that a number of passengers board the 'bus on its way to the park. Passengers taken on at the park for the trip in town continue most of the distance, which brings them to the heart of the city, shopping center and depot.

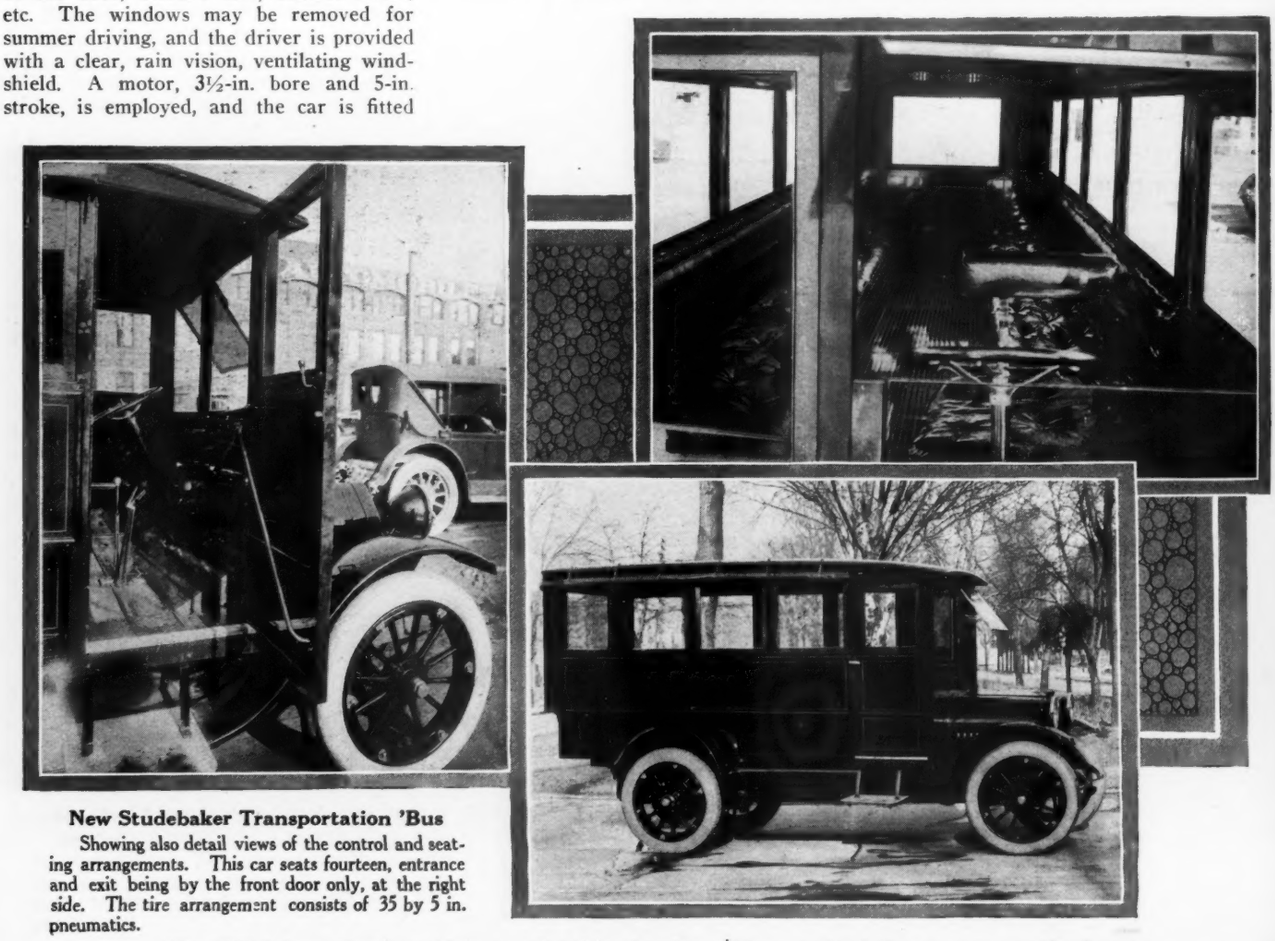
It is figured that a paying basis of operation is reached on this mileage with fifteen passengers per trip, whereas approximately thirty or more passengers will use the 'bus per trip.

The run in both directions is on streets without car lines with little exception, but on streets on which there is much traffic resulting from business houses, which practically line both sides in town and residences which line the balance of route.

This 'bus is shown in an accompanying illustration.



Mooreland 'Buses Used in Panama-Pacific Exposition Grounds



New Studebaker Transportation 'Bus

Showing also detail views of the control and seating arrangements. This car seats fourteen, entrance and exit being by the front door only, at the right side. The tire arrangement consists of 35 by 5 in. pneumatics.

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A New Commercial Car Enters the Field: The United

THE United Motor Truck Company, which was formed by the consolidation of the well-known Decatur, Grand Rapids and Parcel Post Companies, announces an entirely new line of commercial cars, in capacities of 1½, 3 and 5 tons. The new company is making an active bid for business on this new and attractive line, and promises to be a factor in the commercial car industry.

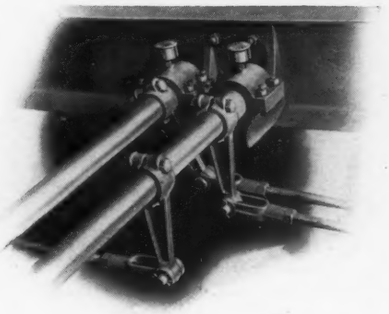
The three-ton model is fitted with a four-cylinder Continental engine, the cylinders of which are cast in pairs, with a separately cast water-jacketed head, which can be easily removed. Lubrication is by double plunger pump and splash system, the lower half of the crankcase being so constructed as to maintain a constant level of oil at all times. Stromberg carburetor and Eisemann magneto with fixed spark are used on this model. An automatic governor, which is entirely closed and sealed, operates on the main throttle. There is a secondary throttle for speeds within the limit of the governed throttle, and this is controlled by a lever operated on the steering column.

Axles

The front axle is a drop forging of a guaranteed capacity of 4500 lbs., and even with the five-ton load evenly distributed on the truck the load on the front axle would only be 3500 lbs. Timken bearings are carried on the steering knuckle head to support the weight of load and make steering easy. Dust proof devices are used on the front spindles and provision is made for lubricating all steering connections. Removable hardened and ground steel bushings are provided for all steering connection bolts.

The rear axle is a rectangular drop forging with a guaranteed capacity of 1100 lbs. The wheel spindles are fitted with Timken roller bearings.

Control on United Trucks
Seat, dash, lamp, steering gear, pedals, switch, gear shift and brake levers

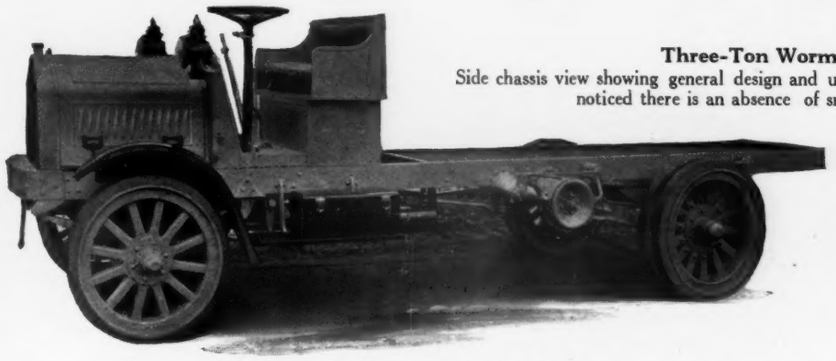


Brake Rocker Arm Bracket Rods and Arms
Showing the straight pull, protected grease cups and the inside suspension on United trucks. The rods are carried in bronze bushings.

Jackshaft

The jackshaft assembly, which carries bevel gears and differential gears, has a pressed-steel housing. By removing a plate the working parts are accessible for cleaning and inspection purposes. All gears and shafts are nickel steel, heat treated, and mounted on Timken roller bearings. The forward sprockets which are on the ends of the jackshaft are designed so that the chain line is directly over the bearings, and the entire unit can be quickly and easily removed from the truck.

Three-Ton Worm-Drive United Truck
Side chassis view showing general design and upswept cross brace over propeller-shaft. It will be noticed there is an absence of small odds and ends around the vehicle



Side View of Three-Ton United Truck
Chain-drive job with body removed, showing sturdy design of rear wheels, jackshaft and its mounting, and other details

Transmission

The transmission is of Brown-Lipe manufacture of selective type, giving three speeds forward and one reverse. This transmission is combined with the engine and clutch, forming a complete unit power plant. The clutch is of multiple-disc type arranged for gradual engagement and is said to work equally well both winter and summer, no oil being required. In the clutch are thirteen steel discs, six of which are faced with Raybestos on both sides. The clutch is located in the motor flywheel

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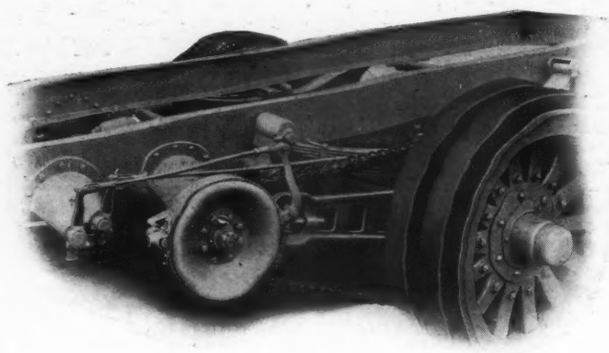
and is protected from dust by an aluminum housing, which encloses the flywheel and *connects the transmission with the engine.* A rocker shaft which operates the clutch extends through this housing, and a foot pedal is attached to it. Thus no operating pedal parts are exposed.

Brake facing is Thermoid. The emergency brakes are of the expanding type, and are *faced with Raybestos acting on 18-in.* pressed steel brake drums on the rear wheels.

The three-ton trucks are built in different lengths of wheelbase: 10, 12, 14, 16, and 18 ft. The price of the standard length chassis, which is 12 ft., is $2750 for chain drive and $2950 for worm drive. The 10 and 14 ft. wheelbases are $50 extra, and the 16 and 18 ft. wheelbases $100 extra. The very long wheelbases are for carrying lumber, furniture and poles.



United Jackshaft and Axle
Three-ton chain-drive jackshaft and rear axle, with connecting radius rods

Spicer universal joints are used from the transmission to the jackshaft. These joints are protected by metal dust proof housings, and have ample provision for lubrication.

The springs are of Perfection make, the front 45x2½ in., rear 52x3½ in. All spring eyes are bronze bushed, and the spring bolts are fitted with grease cups.

Other Details

The frame is channel section 6x7-16 in. Gasoline tank under the seat, capacity 28 gal. Steering gear is of Gemmer make, worm and gear type surmounted by an 18-in. hand wheel. Rear wheels have fourteen 2½-in. spokes, the spokes being almost 6½ in. from hub flange to felloe. The front wheels have twelve 2½-in. spokes. The wheels conform to the S.A.E. standard, and will take any make of tire. Front tires are 35x5 single, rear 36x5 dual. Inasmuch as the tires on the front and the rear are the same size, using two on each rear and one on each front wheel, the tires will fit on any wheel and can be interchanged by the driver.

The tread is 72 in. in the rear with 5 in. dual tires, the front tread being 65 in. with the same size tires. This allows the front tires to track with the inside rear tires.

The service brakes are operated by pedal and are of the external contracting type, operating on 12-in. pressed steel drums.

United Five-Ton Truck

This model is fitted with a Continental four-cylinder 4½x5½-in. engine, Mayo radiator, multiple disc clutch, Timken axles, Perfection springs. Whitney chains (on the chain drive model) 36x5 in. single tires front, 40x6 in. dual rear. Standard wheelbase is 12 ft., optional wheelbases at extra prices are 10, 14, 16, and 18 ft. Price with standard wheelbase is $3400.

Constructive Details

On the three-ton worm a Timken-David-Brown No. 6650 axle is used, having a gear ratio of 10⅓ to 1. Torque and drive are taken through springs. At a point where spring bolt is taken by the rear spring front bracket is thrown in a malleable steel casting, weighing in excess of 100 lbs., with the result the frame is quite rigid.

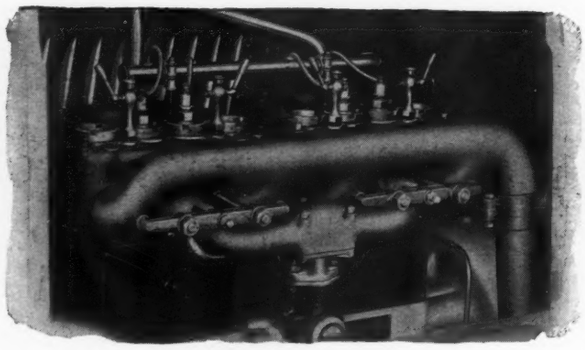
The springs are so designed in both the two- and three-ton worm drive jobs as to be perfectly flat and drive in a line, under rated load, at which time the tubular drive shaft, from engine to rear axle, as well as brake rods, are in a line.

Both the two- and three-ton worm drive trucks throttle down to as low as 3 to 3½ m.p.h., under load, on really bad roads.

On the two- and three-ton worm drive trucks, as on the three- and five-ton chain drive trucks, the front ends are precisely the same from the appearance standpoint in that they are used on all jobs the same diameters, front wheels, same fenders, running board hangers, same bumper, curvature of radiator, curvature of hood and crown, same dash, front axle assemblies, seats, precisely the same gear shifts, levers, lamps and steering wheel. In other words, the only difference in the front end of the cars, in any case, is depth of frame, being a 5-in. on a two-ton, 6-in. on a three-ton and 7-in. on the five-ton, bore and stroke of engine, weight of front springs and size of transmission.

A two-ton truck with Continental motor 4⅛x5¼; Eisemann magneto, water-proof type, fixed spark; Stromberg carburetor with hot air intake; Mayo wireless type, suspended, shock-proof radiator; Brown-Lipe transmission; 2½-in. drive shaft, universal joints, metal cased; two sets of brakes on

United States Drive
Jackshaft and brake-rod assembly on three-ton chain-drive model



Continential Engine on United Trucks
Views from the intake side showing the Kramer governor and Model E 4½ x 5½ in. engine

rear wheels as on Timken No. 6550 assembly 17x2¾ in.; 5-in. structural steel frame; Perfection springs of silico-manganese alloy steel, semi-elliptic. All springs are bronze bushed and all spring shackel bolts having grease cups. A three-ton Timken front axle is used on the two-ton job and the No. 6550 Timken-David-Brown worm drive rear axle. Gemmer steering wheel 28 in. diameter; gas tank manufactured of heavy material and electrically welded, 28 gal. capacity; tires are 36x4 front and 36x4 dual rear. Gear ratio is 7¾ to 1. Left side drive, gas control on the steering column, clutch and brake operated by separate pedals. Center control, gear shift and emergency brake in center, seat can be entered from either side, which is of interest to users of motor trucks. Wheelbase 144 in., yet short or long, lengths are optional. Tread 58 in. Kramer governor is used to suit owner's requirements and standard equipment is furnished, which includes seat, fenders, running board, tool box, oil lamps side and rear, horn, heavy jack and set of tools. Truck weighs slightly in excess of 4000 lbs. Loading space behind seat is 120 in., price is $2150 f.o.b. Grand Rapids, Michigan, in priming coat.

United Three-Ton Truck

Being driven up a 19.5 per cent grade, one-half mile long, on second speed. This illustration shows the straight-line drive of the propeller-shaft, the flat drive of the springs, and the general layout of the whole job.

Sterling Two and Three-Ton Worm-Drive Trucks

IN its new series of two- and three-ton worm drive trucks, the Sternberg Motor Truck Company, of West Allis, Milwaukee, Wis., announces that a high degree of simplicity has been attained in their design. That unusual simplicity is one of the most distinguishing ear-marks of these worm driven units is obvious from an inspection of the three-quarter view of the chassis back of the driver's seat. All told, the number of details eliminated in the chassis as a whole over the average worm drive chassis in 275 components.

Extraordinary light weight of chassis is an additional feature which the Sternberg Company claims its worm drive models possess to an unequalled degree among equivalently rated truck chassis. The two-ton unit with tires, tool box, driver's cab, scales 5400 lbs. and the three-ton with similar equipment weighs approximately 6350 lbs.

Similarity of Models

The Sterling series of worm drive units are to be built in ½, 2, 3 and 5 ton capacities. At this time, only the two- and three-ton units are ready for market. The production of the ½-ton worm (to be described later) is scheduled to commence in April. The Sternberg Company states that the four worm drive units will be of such uniformity and mechanical similarity in design and construction that any two chasses will differ from the other two only in the matter of proportion. The exactness of engineering design throughout the whole series, instead of a separate engineering design for each unit or any two units, provides a degree of harmony not only in merchandising, but in the maintenance of these four worm trucks, which has not heretofore been attained in motor truck design. In other words, any one of the four worm drive models will illustrate precisely the features to the smallest detail of the other three, and obviously a degree of interchangeability between the two and the three-ton and the three and the five-ton sizes is secured, which is a big factor in the economical operation of the Sterling worm trucks.

Engines

The Sterling two-ton unit is equipped with a 3¾x5¾-power plant, 3-point suspension, the Sterling three-ton unit with a 4¼x5¾-unit power plant. The engines of both trucks are the L-head type, with cylinders cast in pairs, all valves on right side. The engines run on 3-bearing crankshafts. The connecting rod bearing of the 3¾ engine measures 2x2½ in., center main bearing 2x3¼ in. The crankshafts are chrome nickel steel, heat treated, having an elastic limit of 118,000 lbs., tensile strength of 140,000 lbs. The ignition system is of the single type, Eisemann automatic advance magneto furnishing the current and six wires only being required to distribute the current.

The oiling system of the two engines is of combination automatic force feed type, and is constantly efficient, irrespective of the position or angle at which the truck is standing. The functioning of the oiling system depends upon the dip of the connecting rod. Oil is taken from a sump through a screen which runs through the oil pump, and delivered to a ¼-in. copper tube, being fed thence to the four troughs between the connecting rods. These troughs are of such depth that they cannot overflow except when the engine is in a position exceeding 25° angle in any direction. The connecting

Sterling Three-Ton Worm-Drive Truck

Showing straight-line effect, absence of projecting parts, gilled hood, heavy wheels and other details

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rod dips very deeply into the pan on the first and second strokes of the piston. As the number of revolutions of the engine increases, the level in the oil sump is reduced to such a point that the capacity at the dip of the rod for drawing oil out of the pan, just equals the incoming capacity of the oil pump, and the number of dips that the rod makes varies as the number of revolutions. This establishes a level, which is constantly kept regardless of the angle of the engine. Should the lead to one of the pans fail, this pan will fill from the splash and the rod therefore will receive oil, although not in sufficient quantity for continued satisfactory operation. However, this prolongs the automatic feature,

Sterling Control
Showing simplicity of control. Observe the absence of the usual coils, switches, etc

retarding the danger of destruction of bearings until the functioning of the system can be restored to normal.

Transmissions

The transmissions are of the selective sliding gear type, 1-in. face. On direct or third, gear ratios give the trucks speeds of 14½ m.p.h. on the two-ton and 13½ m.p.h. on the three-ton. The intermediate speeds are respectively: 8.2 on the second, 4.3 on first, 3.35 on reverse, for the two-ton unit, and 7.7 on second, 4.0 on first, 3.12 on reverse for the three-ton unit.

Automatic centrifiugal type governors are used on both two- and three-ton sizes. On both units also, multiple dry disc type clutches are employed, the clutch and transmission being a unit with the power plant. A distinctive feature in accessibility is the location of the gear set immediately underneath the footboards of the driver's cab. The removal of these footboards permits immediate inspection and removal of the transmission housing.

From the gear set a tubular drive shaft of 2 in. on the two-ton and 3 in. on the three-ton unit extends exactly horizontally to an overhead type worm-gear axle. The drive shafts are supported in two universal joints only; the shaft being tubular instead of solid, and as it is also designed with a very large factor of safety between maximum possible and critical whipping speed, the latter contingency is impossible. The elimination of two extra joints not only adds to the efficiency of delivery of power at the rear axle, but cuts down greatly the maintenance trouble and expense of numerous universal joints. The front axles are I-beam, drop forged, heat treated, measuring 3 in. on the two-ton and 3⅜ in. on the three-ton unit, being Timken bearing equipped throughout.

Rear Axles

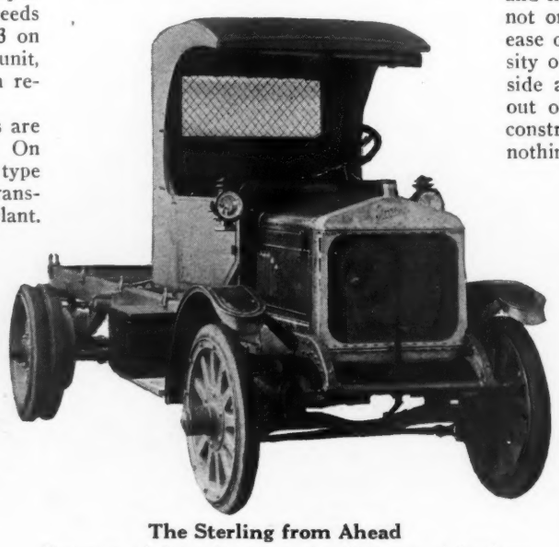
The rear axles are the standard Sheldon semi-floating overhead worm type, equipped with ball thrust bearings. These axles require no adjustment in service and no attention other than the filling of the worm wheel housing with a fresh supply of lubricant every four or five thousand miles of operation. These axles have a mechanical efficiency of 97 per cent. delivery of power of the engine. The worm itself is of the conventional "straight" type, with special method of oiling by means of ducts or channels cut in the differential quadrant support. The delivery of power from the engine in a direct line to the axle gives an unusually high efficiency of transmission.

Frames

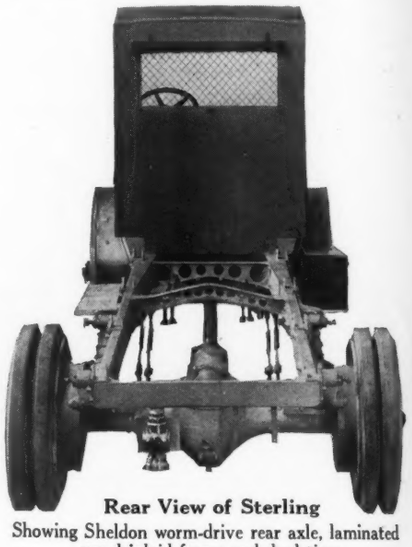
On both two- and three-ton sizes, the frames are of the laminated or wood inlaid type, which has been used by the Sternberg Motor Truck Company for the past 8 years. The advantages claimed for this construction are: increased factor of strength, greater resiliency, bolting of all members instead of riveting, making a permanently solid fastening of components in the frame, absorption of hammer blows from road and load, preventing crystallization. The frame is of the bottle neck type of tapered sections, the greatest depth and width of web being at the point of greatest stress. In the two-ton unit, the frame measures 6 in. deep by 1¾ in. width and in the three-ton, 7 in. deep by 2 in. width. The outside channels are pressed steel, heat treated.

Wheels

The wheels on both the two- and three-ton units are 36 in. all round. On the two-ton they are equipped with 36x4-in. front and 36x4-in. dual rear or 36x7-in. single rear tires; on the three-ton with 36x4-in. front and 36x5-in. dual rear tires. The standard wheels are of second growth hickory with large square spokes. Cast steel wheels can be provided with slight extra cost.



The Sterling from Ahead
Protection of driver by means of quickly opened foredoors and storm curtains on cab. The foredoors can be omitted if desired.



Rear View of Sterling
Showing Sheldon worm-drive rear axle, laminated wood inlaid frame and dual tires

Steering Gear and Brakes

The steering gear in both trucks is of the Ross irreversible worm and nut type, the steering position being at the left with center control levers. The braking system on both trucks is of the internal expanding and external contracting type, equipped with toggle joint levers; both sets of brakes being in the rear wheel hubs. On the two-ton the brake drums measure 18¾x4 in.; on the three-ton the brake drums measure 20x7 in. Either set of brakes possesses power enough to stop the truck going at full speed within its own length, the brakes being of the self-intensifying type, lined with Raybestos.

Control

The control levers, being inside of the cab and immediately at the driver's right hand, not only provide the promptest action and ease of control, but also obviate the necessity of the driver being obliged, as on outside arranged conrol levers, to go in and out of his cab from one side only. The construction is also very clean, as there is nothing to mar the lines of the chassis.

Springs

The springing of these two trucks is by means of semi-elliptic springs. On both units the front springs measure 48 in. long by 2½ in. wide, and the rear springs on both measure 54 in. long by 3 in. wide. On the two-ton the front springs have six leaves; the rear springs ten leaves. On the three-ton the front springs have eight leaves; the rear springs twelve leaves. These unusually long springs, which are made of electro silico-manganese steel, give a remarkably easy springing of the machine under load and provide the resiliency required in absorbing the torque and driving

The CCJ has most readers because it gives most information

stresses, no torque or radius rods being used in either model.

Other Details

The wheelbase of the two-ton Sterling is 148 in. standard and 184 in. special; of the three-ton 158 in. standard and 194 in. special. The rear wheel gage of the two-ton is 59 in.; of the three-ton 66 in. Starters are not standard equipment, but a combination Westinghouse starting and lighting system, operated from the transmission, is provided on the two- or three-ton models at an extra cost of approximately $200. The coupling of a combination starter, generator and lighter to the transmission not only makes for accessibility, but clutters up the power plant to a much less extent than usual, and any operating trouble can be easily taken care of.

Standard equipment consists of all the necessary side and tail oil lamps, horn, complete set of tools and jack, hub mileage recorder, leather upholstered cab with removable aluminum footboards. On both trucks three sets of gear ratios are optional. The standard gear ratios on both models are 7.7 to 1. Optional gear ratios are 8.6 to 1 and 6.5 to 1.

Experimental models of the new Sterling series are claimed to have been operated 60,000 miles with no necessity of replacing the worm and worm wheel. The maximum production capacity of the Sternberg Motor Truck Company on these worm models is said to be fifty machines per week, this capacity having been designed to meet anticipated foreign business.

Chase Trucks—Worm Drive, Three-Quarters to Three and a Half Tons

ONE of the most radical changes of manufacturing policy is the announcement of the Chase Motor Truck Company, of Syracuse, N. Y., covering its 1915 line of cars—Models T-R-O.

The activity of this company to supply the demand for a complete line of cars for light, medium and heavy duty is well reflected in the illustrations of the three cars shown here, ranging in capacity from 1500 lbs. to 7000 lbs.

The chassis prices of Models T-R-O are $1500, $2200 and $3300, respectively. These prices easily convince the trade of the determination of the Chase people to build a car of universal demand, including standard equipment.

From an engineering standpoint the Chase Company seem to have adopted a line of vehicles that strikes a pouplar price appeal as well as to have attained a high degree of mechanical efficiency.

The cars present a beautiful appearance throughout and the graceful lines reflect credit upon their designers.

Specifications—All Models Engines

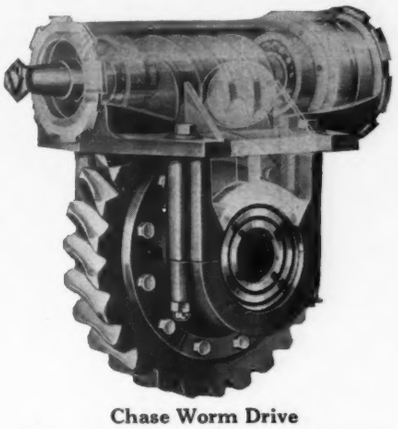
The engines used are made by the Continental Motor Manufacturing Company. All engines are of the "L"-head type, provided with ample water space to secure the maximum cooling effect. Parts are high-grade anti-friction metal. Gears are enclosed to prevent noise and to insure thorough lubrication. All parts are provided with large oiling grooves to which oil is fed by force feed or gravity, as conditions warrant.

The crankcases are cast aluminum with main-frame arms at the rear and trunnion part at the front. This provides for three-point suspension. An automatic motor governor is used in connection with the Holley carburetor.

Radiators

The radiator on the Model "O" has cast top, bottom and side sections with fin and tube center core. This radiator is mounted on springs to prevent any twisting strain.

The radiator on the Model "T" and "R" is the built-up type with fin and tube core mounted on pressed steel, cross member in front of the motor. The radiator mounting is cushioned to insure the radiator from damage due to jar or vibration.



Chase Worm Drive
Phantom view showing bearings, worm, worm wheel and part of housing

Transmissions

The transmissions used on all models are of the sliding gear type, provided for center control. Bearings in the transmission are of the Timken roller bearing type, amply large. The transmissions are mounted in a case which is attached directly to the engine. This forms a unit power plant and insures a dust-proof unit. The transmissions are made by the Brown-Lipe Gear Company.

Clutches

In all three models the multiple-disc, dry-plate clutch is used. These clutches are made of Raybestos, operating against saw-steel. The clutch throughout is of special design, ensuring long life with practically no wear.

Front Axle

The front axles are of Chase design, made of special-analysis steel, drop-forged to shape. The axles are I-beam section with drop center to give a pleasing appearance. The spindles are of special gear steel, properly heat-treated and ground to fit wheel bearings.

Worm Rear Axle

The rear axles are Sheldon make, worm drive; the worm and gear of the David Brown type and so mounted in the case that it is impossible for them to get out of alignment. The differential is mounted in the worm gear and all bearings are ample size ball bearings with special thrust bearing provided on worm shaft and differential.

Brakes

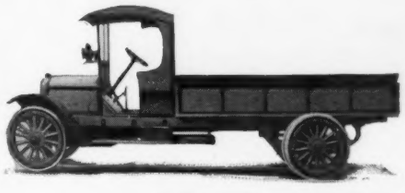
Both brakes operate in the rear wheels and are extremely large, giving special brake area to insure safety under all conditions without danger of destroying braking surface. Brakes are so adjusted as to give the maximum service with the least possible expenditure of power.

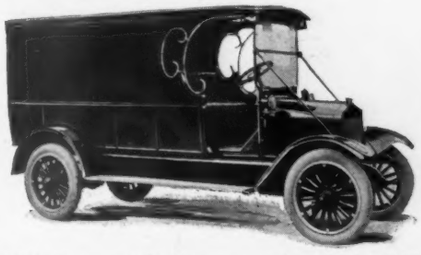
Frames

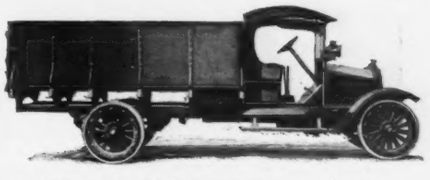
The frames are of hydraulic cold-pressed steel, made from Chase dies and designed to give the maximum strength without impairing the flexibility of the truck. The front part of all frames is narrower to give short turning radius, consistent with the length of the truck.

Springs

All springs are Sheldon semi-elliptic of special alloy steel, thoroughly heat-treated. Spring eyes are bronze bushed, and the spring bolts are hardened and ground with







A Few of the Many Types of Commercial Bodies Furnished by the Chase Motor Truck Company

The CCJ brings greatest returns to advertisers because of largest circulation among quantity buyers

large grease cups to insure thorough lubrication. The front springs are set on top of the axle pad; the rear springs are carried underneath. The rear spring hanging is of Chase special design.

Wheels

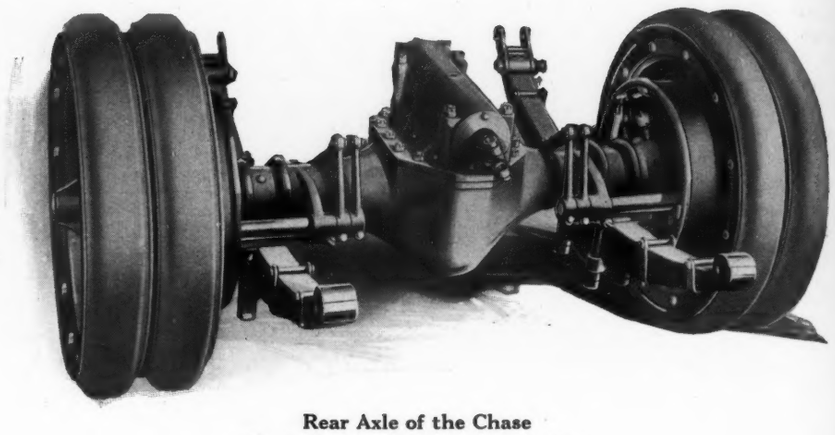
The front wheels are 36 in. in diameter, with 2½-in. tires on the T, 3½-in. on the R and 5-in. on the O, mounted on S.A.E. type of rims front and rear. The rear wheels are 36 in. in diameter with 3½-in. tires on the T, 3½-in. duals on the R and 5-in. duals on the O. The spokes for front and rear are of extra heavy second growth hickory.

Steering Gear

Exceptionally large worm and nut type, ample provision for adjustments for wear provided. Large ball thrust bearing above and below worm 2¼-in. mast, 18-in. hand wheel. Fore and aft steering connections are the Chase special design. Spring shock absorbers prevent undue strain being communicated to the worm or wheel.

Control

The spark control is automatic, the spark advance being controlled by the electrical efficiency of the magneto, due to its high or low speed. The throtte is controlled by the lever on the top of the steering wheel, together with the customary foot accelerator.



Rear Axle of the Chase
Showing husky design and top worm drive

The gear shift lever is in the center of the truck, operating through a dust-proof ball joint. A finger latch must be raised before going into reverse. The emergency brake is operated by a hand lever in the center of the truck. The right pedal operates the service brake and the left pedal the clutch.

Propeller-Shaft and Universal Joints

The propeller shaft is 2½-in. steel tubing welded to Blood Brothers universal joints. These joints are of the block-trunnion type and so constructed as to give maximum service under all conditions. A large size slip joint, to accommodate the variations of wheelbase, under running conditions, is contained in the propeller shaft. All wearing parts of the propeller shaft and universal joints have large grease cavities to simplify oiling.

Bodies

Special tops and bodies are built to order to suit the requirements of any trade.

Denby Trucks Made in Four Capacities

THE Denby Motor Truck Company, 28 DuBois Street, Detroit, Mich., has invaded the commercial car field with four models, the capacities of which are 1500, 2000, 3000 and 4000 lbs.

With the exception of sizes and strength of certain parts, the first two models are very much alike, and the second two models are also very similar to each other. We shall, therefore, divide them into two groups.

Fifteen Hundred and Two Thousand Pound Models

The 1500-lb. model is known as model A; the 2000-lb. model as B. The price of model A chassis is $1500; model B being $1600. The specifications of both these models, except where indicated, are the same.

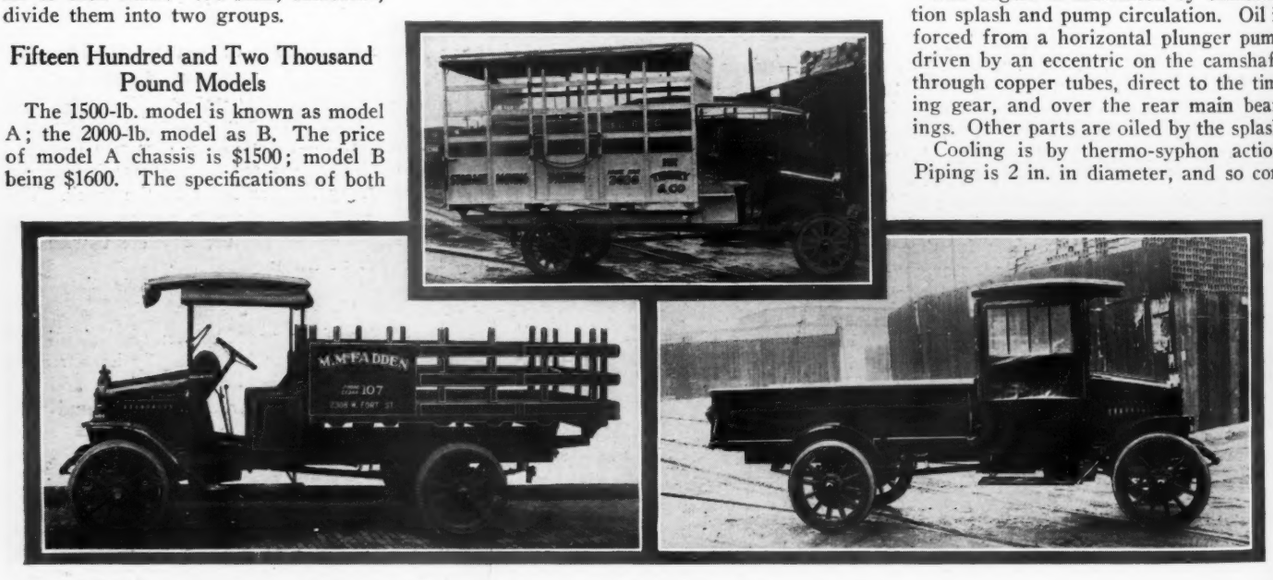
Engines

Engines have four vertical cylinders, cast en bloc L-head, with enclosed valves. Bore is 3½ in.; stroke, 5 in. They are of the unit power plant type, suspended at three points, two on the flywheel housing, and one on the timing gear case. Exhaust manifold is on right side of engine, and is so arranged as to not interfere in any way with free access to the valves. The carburetor, which is of the float-feed type, is placed very close to the engine on the left side. Engine speed is 1320 r.p.m. A centrifugal governor limits the engine speed, and the 16-in. steel fan is mounted on annular bearings.

Ignition is by Eisemann high-tension, waterproof magneto with fixed spark.

The engine is lubricated by combination splash and pump circulation. Oil is forced from a horizontal plunger pump driven by an eccentric on the camshaft, through copper tubes, direct to the timing gear, and over the rear main bearings. Other parts are oiled by the splash.

Cooling is by thermo-syphon action. Piping is 2 in. in diameter, and so con-



A Group of Denby Trucks
Showing the different kinds of bodies which may be fitted to the various chasses. Chasses built in four sizes: 1500, 2000, 3000 and 4000 lbs. capacities

The CCJ is the only truck journal a member of the Audit Bureau of Circulations—Why?

structed that there are no abrupt bends or pockets to obstruct free circulation.

The radiator is built up of cast top and bottom tank supported by steel side plates, so that the core does not carry any of the strain, due to the hanging of the radiator, neither is there any possibility of leakage from twisting. The radiator is mounted on rubber bumpers on the front cross member.

Transmission, Clutch and Drive

Transmission is of selective sliding type, with three speeds forward and one reverse. The gear shifting is by tilting lever directly in top of transmission case. Shafts throughout the transmission are mounted on annular ball bearings.

A dry disc clutch is used, containing thirteen discs faced with Raybestos. The diameter of the discs is 8 in., faces 1 in.; eight driving studs, 5/8 in. in diameter.

Drive is through open tubular propeller shaft, 2½ in. in diameter, with ⅛ in. walls. It has universal joints at both ends. Final drive is through bevel differential, and floating jackshafts mounted on the rear axle, the final reduction being through pinions and annular gears.

Axles, Brakes and Wheels

The front axle is a drop-forged straight I-beam. The cross tube is in front so as to give greater clearance. Wheels are mounted on Timken roller bearings, all other bearings being hardened and ground steel bushings.

The rear axle is 2½ in. round section; wheels mounted on taper roller bearings.

Two sets of brakes are provided, both located on the rear wheels, operating on 16-in. drums. The service brakes are of the external type, operated by pedal, the emergency set being of internal type, operated by hand lever, mounted on the transmission case.

Other Details of Types A and B

Speed is 18 m.p.h., frame pressed steel, 3-16 in. stock, 4 7-16 in. deep. Flanges vary from 2¼ to 4 in. Frame is 34 in. wide back of seat, and between the seat and dash narrows to 30½ in. so as to give short turning radius.

Springs are half-elliptic, unusually long and flat, so as to obtain easy riding qualities. The driving and braking strains are taken through the rear springs, making a flexible drive. Front springs are 44x2½ in., rear 52x3 in.

Chassis weight, with driver's seat and full equipment, 3200 lbs. on type A, 3400 lbs. on type B.

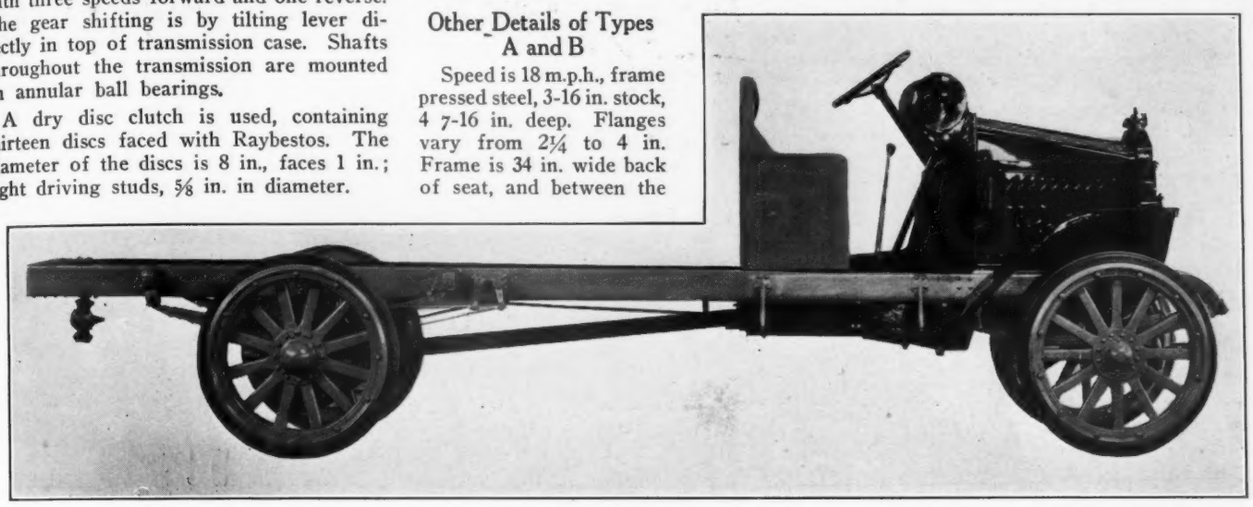
Wheelbase 120 in., both models. Tread 56-in. front, 58½-in. rear on type A; 56½-in. front, 59-in. rear on type B.

Wheels are of wood, each having twelve 1¼-in. square spokes. Tires are solid, 34x3-in. front, 34x4-in. rear, on model A. and 34x3½-in. front, 34x5-in. rear, on model B.

Types D and E—3400 and 4000 Pounds

These models are priced at $1900 and $2100, respectively. The engines are 3¾x5 in., rear axle 3-in. section, tires 34x3½ front, 36x5 rear, on type D; 34x4 front, 36x3½ dual rear, on type E. Weights, 3900 lbs. for D, and 4100 lbs. for E. Treads 57 in. front, 62 in. rear on D; 58 in. front, 64 in. rear on E.

In most other respects and with, of course, the use of heavier parts, the other specifications are the same as for the previously described models.



Side View of Denby Chassis

The most noticeable feature is the mounting of the cylindrical fourteen gallon gasoline tank on the dash. This, with the steamline hood and cowled dash, gives a very unique appearance to the car. The model shown is the D—one and a half ton size

Stewart Ambulance Used by United Stated Government, at Chelsea, Mass., Navy Hospital

So constructed that it can be quickly converted into a squad wagon, for transporting men, the upper stretchers being withdrawn and placed on the lower, thus making seats, while the framework of the upper stretchers folds up. Built by the Stewart Motor Corporation, Randall and Superior Streets, Buffalo, New York.

The CCJ leads in circulation, advertising and prestige

Standard Tractor Made in Two Sizes

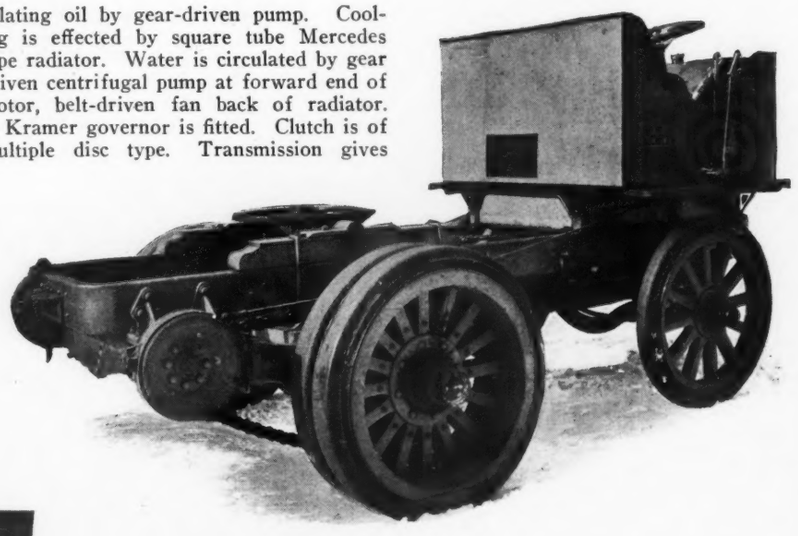
THE STANDARD TRACTOR COMPANY, 90 West Street, New York City, is building its standard tractor in two sizes, 6 and 10 tons capacity, respectively. One of the prominent features of this machine is its compactness, it extending less than 6 ft. in front of the body of the trailer. This is 4 ft. shorter than the body of the ordinary horse vehicle. The ten-ton tractor turns in a circle of 27 ft.

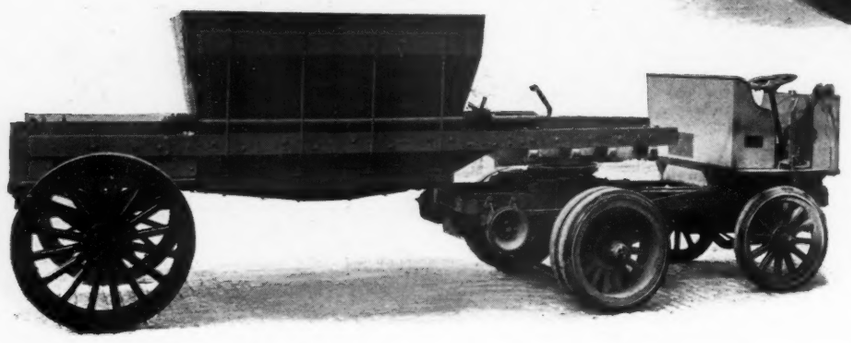
This company is also bringing out a tractor, similar to the ten-ton size, with the exception that it will be worm-driven. This machine is intended for very heavy work, or for pulling a team of trailers, and will have a speed of not over 6 m.p.h. All of the ten-ton tractors can be equipped with air brakes on the iron shod wheels of the trailer, at an extra charge. Self starter is also applied, if desired.

The Model B six-ton tractor lists at $3000, including driver's seat; oil side and tail lights; full set of tools and jack; long horn and hub odometer. The Model D ten-ton tractor lists at $3750.

Brief details of the six-ton machine are as follows: Engine, four-cylinder, water-cooled, three-point suspension, bronze crankcase, 4½-in. bore by 5-in. stroke, 32.4 h.p. S. A. E. rating. Lubrication is by automatic system constant level, circulating oil by gear-driven pump. Cooling is effected by square tube Mercedes type radiator. Water is circulated by gear driven centrifugal pump at forward end of motor, belt-driven fan back of radiator. A Kramer governor is fitted. Clutch is of multiple disc type. Transmission gives three speeds forward and one reverse, and is mounted as a unit with the engine.

As will be noted from one of the accompanying illustrations, the jackshaft is placed at the rear of the trailer, the driving wheel being ahead. The jackshaft carries the foot brakes, which are 14 in. in diameter and 2 in. wide. The emergency brakes are on the rear wheel hubs, 18¾ in. in diameter and 3½ in. wide. Rear axle is of Timken Detroit type, while all bearings, except ball bearings in the clutch release and fan, are also of Timken make.





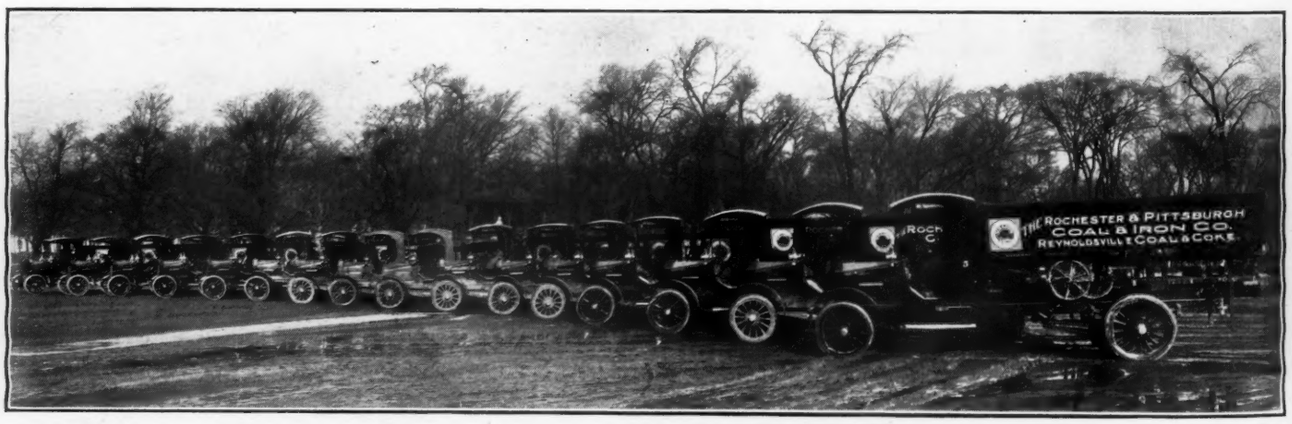
The Standard Tractor

Above view shows the novel displacement of jackshaft. The lower view shows the long overhang of the trailer over the tractor, which accounts for the short turning radius of this outfit.

Springs are half elliptic, 36x2¼ in. front, and 44x3½ in. rear.

Tires are 34x4 in. front, single; 36x5 in. dual, rear. Wheelbase is 72 in. The frame is made of heat treated steel 6 in. channel, 2 in. flange, preventing all racking. The machine weighs 5000 lbs. Fuel capacity is 20 gals. Normal speed is 9 m.p.h.

The Model D ten-ton machine is built along lines similar to the six-ton tractor being, however, heavier throughout. Specifications as follows: Engine, 38 h.p.; single dry disc clutch; springs, 48x2¼ in. front, 58x4 in. rear; 14x2½ in. foot brakes, 20x4 in. emergency; tires, 38x4 in. single front, 40x6 in dual rear; main frame, 7⅛ in., 4 in. sub-frame; weight, 6500 pounds; 24 gals. fuel capacity. All other specifications same as for Model B.



A Fleet of Sixteen Five-Ton Pierce-Arrow Trucks

Owned by Spaulding & Spaulding, Buffalo, N. Y., wholesale coal dealers and mine operators. All are dump bodies. It is estimated that they save about forty per cent over the old system, horse-drawn and hand-shoveling

The CCJ has most advertisers because it gives them biggest returns

A MACK FIVE-TON TRACTOR AND TEN-TON TRAILER USED IN A LARGE MILK ESTABLISHMENT

This standard five-ton Mack tractor, made by the International Motor Company, New York City, has a 10 ft. 11 in. wheelbase and is connected by means of a universal coupling or fifth wheel to a specially constructed closed trailer which has a capacity of 10 tons.

The trailer has Timken rear axle bearings with 54-in. wheels and 10-in. steel tires. The body is 17 ft. long, 6 ft. high at the front and 6 ft. 3½ in. high at the rear, width 6 ft. 9 in., all inside measurements. The body has two loading platforms, the first the main floor, the second 28½ in. from the floor, extends the full length of the body. This second tier is built by placing 12-in. boards across the body, which are easily removable.

The trailer body has a capacity of 168 cans of milk, weighing approximately 125 lbs. each. Ninety cans are placed on the tier and seventy-eight on the floor.

Two men load the truck, one at the front end of the body, and one at the rear. The man at the rear loads the cans from the train platform, which platform is even with the tail gate of the trailer, and merely give the cans a shove, sending them easily to the man at the forward end of the body. A 16-in. steel plate, countersunk in the floor, extends full length of the body upon which the cans slide.

In loading, the floor and upper tier are loaded simultaneously; that is, they will put two rows of milk cans on the body across the floor, then put in two shelves and load these, and then two more rows of cans on the floor, and two more shelves, etc., progressing from the front of the body to the rear. In this way the body is loaded in approximately 20 minutes.

Total useful load weight	21,000	lbs.
Body weight (approximately)..	3,200	"
Total	24,200	"
64¼% weight on trailer axle.		
35¾% weight on tractor.		
Body and load weight on trailer axle	15,400	lbs.
Body and load weight on tractor	8,800	"
Price of five-ton Mack tractor	$4,000	
Extra for "fifth wheel" with springs	200	
Extra for trailer frame and body...	1,500	
	$5,700	

Mr. Woolman's idea in buying this truck was to replace two three-horse wagons that he used to haul milk from the railroad depot to his plant, and from his plant to the distributing stations. With two three-horse wagons, it was necessary to carry two extra horses; therefore the truck replaces eight horses.

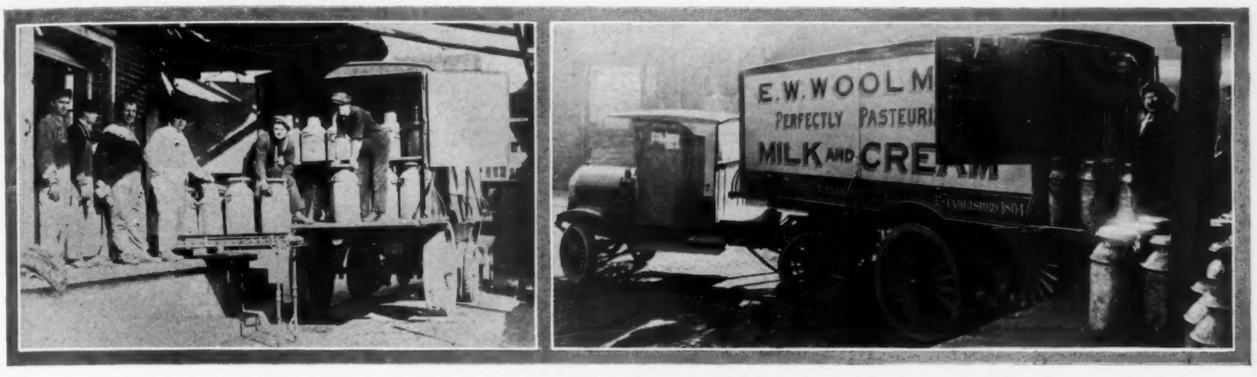
This truck leaves his plant at 4709 Lancaster Avenue, 7.30 a. m., going to Thirty-first and Chestnut (Pennsylvania Railroad Milk Depot) and hauls two loads of 168 cans each back to the plant. This distance is approximately 3 miles each way. A trip is then made to Twenty-fifth and Spruce (B. & O. Depot) and from there one load of approximately 150 cans is taken. This distance is about 3¼ miles each way. The men then go to their lunch and in the afternoon the truck is used for unloading carloads of bottles which come in at Fifty-second and Lancaster Avenue. The number of trips made on this job depends on the carloads of milk they are able to get in at one time.

When not hauling new bottles from the freight station, they haul bottles, to be exchanged, to the Philadelphia Bottle Exchange at Eleventh and Poplar Streets, which is practically 5 miles each way.

The truck is then loaded at 5 p.m. at the plant with milk in can and bottles, including pints, half pints and quarts of milk and cream, which are hauled to his distributing station at Darby and unloaded. This loading takes about one hour; the distance is about 6 miles each way. The truck is unloaded at Darby and loaded with empty bottles and cans to come back to the plant.

Another trip is then made to Thirty-first and Chestnut (Pennsylvania Milk Depot), taking down a load of empty cans, and bringing back a load of full cans. This would be about 10.30, and the truck is put in the garage until 7.30 the next morning.

Mr. Woolman has two drivers operate this truck. Both men work all morning; one driver goes home at noon, returning to work at 6 o'clock and working until 10.30. The other driver goes home at 6 for the day. They reverse these conditions every other week.



Mack Five-Ton Tractor and Ten-Ton Trailer Used By Large Milk Concern in Philadelphia

Overman, T. W., and W. B. Dodds have organized a company to establish an automobile passenger service between Hartford City and Gas City, Ind. It is planned to run an hourly schedule.

Locomobile Four-Tonners Used on Los Angeles Fortifications

Four are at work, and another is about to start. They carry concrete material and machinery at Los Angeles Harbor. The haul is about 1¼ miles, over stiff grades of ten to eighteen per cent, on bad roads. The steel dump bodies are operated by the engine in twenty seconds. The trucks are owned and operated by the War Department.

The CCJ has most readers because it gives most information

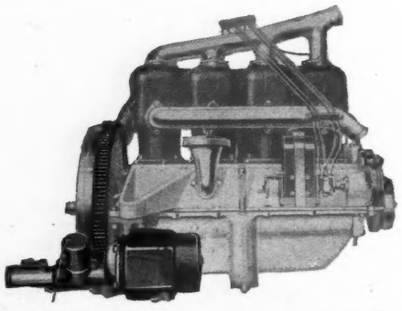
Starting and Lighting for Commercial Cars

IT IS but natural that what has become standard on pleasure vehicles should show a tendency to be used each year in increasing numbers on commercial vehicles. There are a good many makers of starting devices, but comparatively few have as yet made any attempt to sell to truck manufacturers; in fact the use of starting and lighting systems and particularly starting motors on trucks has only begun, and is almost entirely confined to small delivery vehicles.

Whether starting is of sufficient advantage on heavy commercial units to make it worth while to instal same is a question which has been answered in the negative by most of the makers. Large trucks are in the majority of cases used for long hauls with but comparatively few stops. They are not making house to house deliveries. The motors are started and stopped but few times during the working day. Where they are used on shorter hauls it is nearly always in connection with dumping bodies, most of which are also operated by the engine, and for this reason the engine has to run anyway.

Advantages of Starters on Delivery Vehicles

On delivery vehicles, however, it is an entirely different story, as these are making numerous stops in the routine of a day's work, the stops running sometimes as high as 150 to 200. During all of these stops the engine is sure to be left running, if no starting device is provided. It has been estimated that such vehicles are standing still from 50 to 60 per cent. of the time, which means that in an 8-hour day they are often idle at least 4 hours, which during the week is equivalent to 3 working days of 8 hours, and during the year 156 working days, so that it will readily be seen that if the engine were left running all of this time it would be subject to considerable wear, to say nothing of the gasoline consumed.



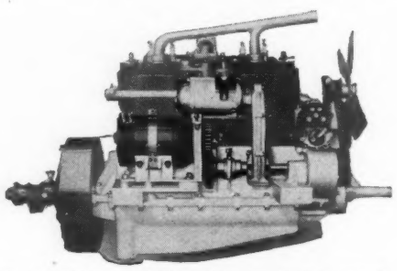
Auto-Lite System as Mounted on Willys-Overland Delivery

A loss of fuel is not the only thing to be considered, however, in a delivery vehicle, which goes to individual homes. If the engines are stopped for deliveries which require some time, the driver must of necessity go into the street to crank the engine again, which in certain cases means that his boots will be muddied, and doorsteps and porches must be tracked up, which is not advisable where high-class suburban trade is concerned.

Occasionally, even large heavier vehicles are used in a service requiring numerous stops. In this case a starter would be an advantage. The following figures show the record of a large truck under these conditions. The saving is very noticeable.

Saving of Thirty-nine and a Half Per Cent by Using Starter

Record of Packard Truck No. 3, fitted with Standard Appliance Company's starter and owned by the Pittsburgh Dry Goods Company, Pittsburgh, Pa., showing mileage, gas consumption and starts for 26 days from November 10, 1914, to December 10, 1914, inclusive. This truck is of 3 tons capacity and used for delivering dry goods to retail dealers in and about the city.



Power Plant of One Ton and One and a Half Ton Velie, Showing Electric Motor and Generator Installed

Date. 1914.		Mileage.	Gas. Gals.	Stops-Starts.
November,	10...	33	5	35
"	11...	39	6	50
"	12...	32	5	37
"	13...	33	6	35
"	14...	24	4	35
"	16...	30	6	40
"	17...	37	7	50
"	18...	33	6½	50
"	19...	35	6	45
"	20...	26	5	45
"	21...	55	11	70
"	23...	33	6	45
"	24...	47	9½	79
"	25...	29	5	50
"	28...	49	10	88
December,	1...	37	6	45
"	2...	33	6	40
"	3...	37	6	57
"	4...	33	6	45
"	5...	26	5	45
"	7...	28	6	35
"	8...	41	6	45
"	9...	32	5	45
"	10...	30	5	45
	26	832	149	1156

General daily average for 26 days: Miles per day, 32; miles per gal. (gas), 5.58 plus; daily stops, 44.

Maximum mileage per gal. gas before starter was installed—4 miles per gal.

Increase of 1.58 miles per gal.—saving of 39½ per cent.—or an increase of that per cent. in mileage.

It will be noticed that this truck was fitted with the starting system of the Standard Appliance Company, of Franklin, Pa., described in detail in our March issue among truck accessories, page 23. This starter is of the air type and is intended and in fact designed, according to its manufacturers, for heavy duty work such as on trucks.

B. A. Gramm a Pioneer

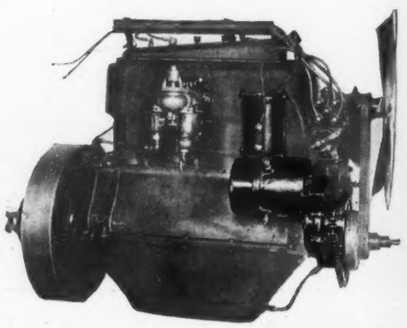
In 1912 B. A. Gramm showed trucks at the New York Show of 3½ tons capacity with regular equipment of starting and lighting. This was a special equipment worked out sufficiently substantial in its parts for truck use. His experiments showed that vibration was the great difficulty, especially affecting the batteries when carried on the running board or under the seat. This was overcome by mounting the battery in a cage hung under the seat, or inside the frame between eight helical springs. In place of the regular lid of the transmission case a lid with the starter outfit is supplied as shown in the accompanying illustrations. No particular motor or generator is necessary, it is always possible to instal this mechanism on any of the trucks by replacing the transmission case cover with the outfit mentioned. Various makes of starters can be installed according to arrangement with purchaser.

Electric lighting is cared for by a Westinghouse generator and distributor mounted and operated directly from the motor.

Mr. Gramm makes the statement in connection with results obtained on trucks fitted with starting and lighting, that 95 per cent. of all the trucks shipped in the last 2 years, have been so equipped with the exception of a foreign shipment, and he says that none of them care to go back to the old time cranking and oil lights. When one customer was told he could save $200 by leaving off the starter and electric lights, he said, "That is the best thing you have on your truck, and it will easily save its price within a year." According to Mr. Gramm, this seemed to be the opinion of a good many buyers although he has never figured it out in dollars and cents, but believes that starting and lighting is more necessary on a truck than on a pleasure car.

Studebaker Fifteen Hundred Pound Car With Starting and Lighting

This well-known car is fitted with the same starting and lighting as the Studebaker pleasure car, the equipment being the Wagner Electric Company's of St. Louis, Mo. The method of installing is shown in the accompanying illustration of the engine. It is a six-volt system used in con-



Wagner Electric Company's Starter Applied to Studebaker Fifteen Hundred Pound Truck

junction with the Willard three-cell storage battery. Accessibility is one of the notable features of the system as applied to these cars. Separate unit systems are now supplied, and according to the Studebaker Corporation, are giving satisfactory service.

The starting motor can be removed by simply taking off one nut and two cotter pins. This starting motor drives through a silent chain and over-running clutch. The clutch of course lets go as soon as the engine speed exceeds the starting motor speed or as soon as the foot is removed from the starter button. By this arrangement the chain and starting motor are in operation only while cranking the car, and furthermore they can be brought into operation in case the car shows signs of stalling before the engine gets to a dead stop.

The makers state: "We have not made any extensive studies showing the number of starts and stops which are made during a day's run, but the following are some extracts from various reports which have come to us from our dealers and salesmen in the commercial car field:"

A report from Peoria, Ill., from cars in the service of the Peoria Apron & Supply Company, states that on the average of 148 stops are being made in the morning and between fifty and sixty stops in the afternoon, that almost invariably the engine is stopped at every place, and that as yet the starter has not refused to work.

Another report comes from Portland, Ore., and covers the use of cars in the service of the Home Cream Company, in which 160 stops a day are being made, and in which the starter has not failed to work. In fact on one of the cars the starting crank was mislaid the first day the car was received and no attempt has been made to replace it.

Willys-Overland Delivery Cars Have Starters

The starting and lighting outfits of the Willys-Overland delivery vehicles are especially designed Overland equipment made by the Autolite Company, of Toledo, Ohio, and are the same as used on the Overland pleasure cars. The accompanying illustration shows the mounting of the two-unit six-volt starting and lighting system on these small delivery vehicles. The generator is designed solely for producing current, the starting motor does nothing but crank the engine, using the stored up current. Simplicity and efficiency are claimed for the system, as well as automatic operation. Ignition current is provided by an entirely separate high tension magneto.

Velie Trucks Fitted With Starters

In the accompanying illustration is shown the power plant of the one-ton and one and a half ton Velie truck, showing the electric starting and lighting motor and generator as installed. This company claims that electric starting and lighting systems are only satisfactory when used on pneumatic-tired vehicles. The starting and lighting is therefore applied by them to the trucks which are all pneumatic equipped, or at least equipped with pneumatics on the front wheels. They discourage the use of electric equipment on solid-tired models. The greatest item of advantage in such equipment as stated by them is, "the driver will stop his engine when he stops his truck for the simple reason that he can start it again conveniently. He will not stop his engine if it is necessary to crank it up again. The material saving noticed in the use of the starter is in gasoline consumption therefore, and our figures show that it amounts to about 25 per cent. of the total volume used."

Westinghouse Starter

The Westinghouse starting and lighting system we are informed by them, is used on the American La-France Fire engines, Atterbury motor trucks, on the Lauth-Juergens, Moreland motor trucks, manufactured in Los Angeles, Cal., Seagrave fire apparatus, and by the Stewart Motor Corporation, of Buffalo, on the Stewart trucks, this being identically the same equipment as supplied by them for pleasure cars.

The Remy Electric Company, of Anderson, Ind., supply starting and lighting apparatus, which it is claimed is suitable for commercial cars, which is now being used on several of these cars, but is not supplied by any of the makers as regular equipment on trucks.

Bosch-Rushmore Starter

The Rushmore Dynamo Works supply the Bosch-Rushmore starter, which operates in connection with the flywheel gear. The armature is moved lengthwise into its working position in which its gear meshes with the flywheel gear by means of the traction of the pole pieces when the starting switch is closed. When the engine starts and the motor is relieved of its load the current drops and automatically a spring pushes the armature pinion out of engagement.

The Disco Starter

The Disco Electric Starter Company, of Detroit, Mich., recommend their single unit type as being particularly adapted for use on commercial cars, owing to its simplicity, but state that they have not up to the present time given commercial cars much thought but further say:

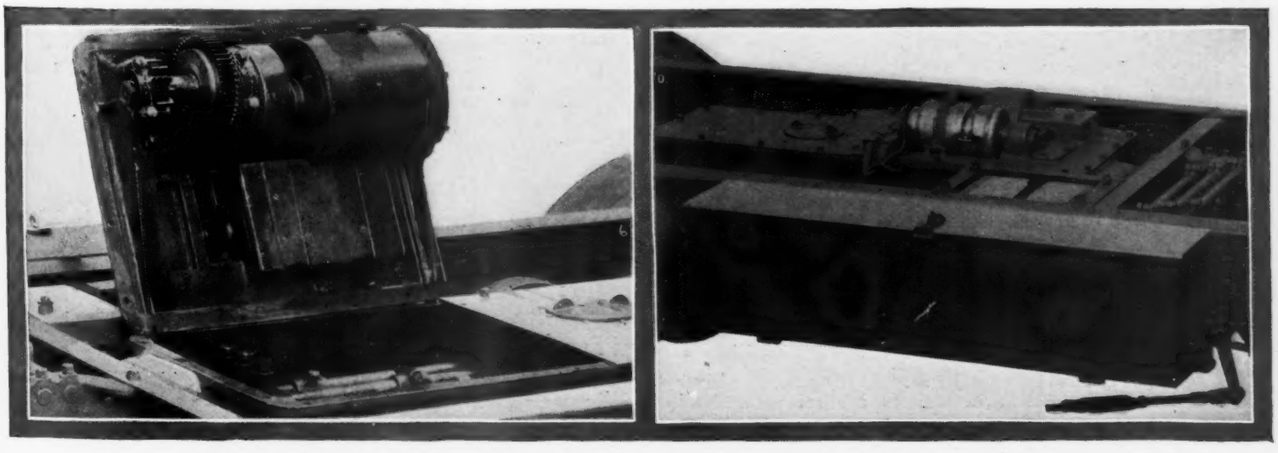
"We are, however, in correspondence with several such manufacturers at the present time, and there is apparently a growing interest in the use of the electric starters and electric lights on trucks."

We can see many advantages in this use, one of the most obvious, being that the engine of the commercial car will not be left running while deliveries are being made, in order to avoid the necessity of cranking the engine.

Air Starters

The manufacturers of air starters make the claim that their product is particularly suitable for trucks owing to the sturdiness of construction, and absence of ill effects from vibration. Among those making special efforts for commercial business may be mentioned the Standard Appliance Company, makers of the Standard Air Starter, The Northern Engineering Works, of Detroit, Mich., makers of the Thurber Rotary Air Starter, and the Goodwin & Miles Company, of San Francisco, Cal., makers of the G. & M. starter, the latter being for small cars. The Thurber is attached to the front at the end of the engine shaft. It is made in three sizes, model M being for large cars and trucks. The starter consists of a rotor operated by compressed air from a storage battery tank, and a control valve with pedal push buttons operating same from the floor boards. The air pressure is provided by a two-cylinder improved direct connected air pump. The air pump is on the front of the rotor, the tanks are located on the car at any convenient point.

The G. & M. Starter distributes the air pressure to the various cylinders at the



On the B. A. Gramm Truck the Starting Motor is Fastened to the Transmission Case Lid

The CCJ is the only truck journal a member of the Audit Bureau of Circulations—Why?

proper time for the firing stroke of each cylinder, thus converting the engine into an air engine while it is being started from the air pressure stored in an air reservoir. The pressure is stored by means of a small jet from the explosive pressure when the engine is running.

SALESMANSHIP OR A FOOL FOR LUCK

By LEN G. SHAW

"Somehow I never was very strong on that casting your bread upon the water doctrine, but I had my views changed in a most unexpected manner," said Joe Rawson, selling representative for a well-known line of motor trucks in a middle western city. He paused to light a fresh cigar, and the others in the group, who had been swapping experiences, waited expectantly for the recital of what had caused this conversation.

"I had a hunch that a certain concern in this town could use a couple more trucks to good advantage. I spent the best part of a week quietly studying the delivery system maintained by the firm, and when I had my dope all in shape called on the vice-president, who is also the general manager.

"He didn't warm up a bit when I told him my mission—said right off the bat that they had more trucks at that very minute than he wished they had, for money was being lost on them every day. Whenever I started to state my case he would head me off—not savage a bit, but in a way that forced me to begin all over again. If he had been willing to give up the time I could have sat there until the crack of doom and never sold him a truck. I've cracked some hard nuts in my day, but I never saw a man soured any worse on motor trucks. He simply wouldn't have anything to do with them.

"It kind of got under my hide to think of the time I had spent doping out his needs, only to be thrown down.

"It wasn't any use hanging around there any longer, so I got ready to leave.

"'I can see that you are not in any mood to discuss more motor equipment,' I told him, 'but I have just one favor to ask of you. You know your business from A to izzard and back again. I'd appreciate it if sometime when you have a little leisure you would look over this report I made out and tell me your honest opinion regarding it.'

"Then I gave him the dope I had prepared on his business, and left. It wasn't any good to me—and he might as well have the information it contained.

"The next day when I got back to the office there was a note telling me to call up the vice-president.

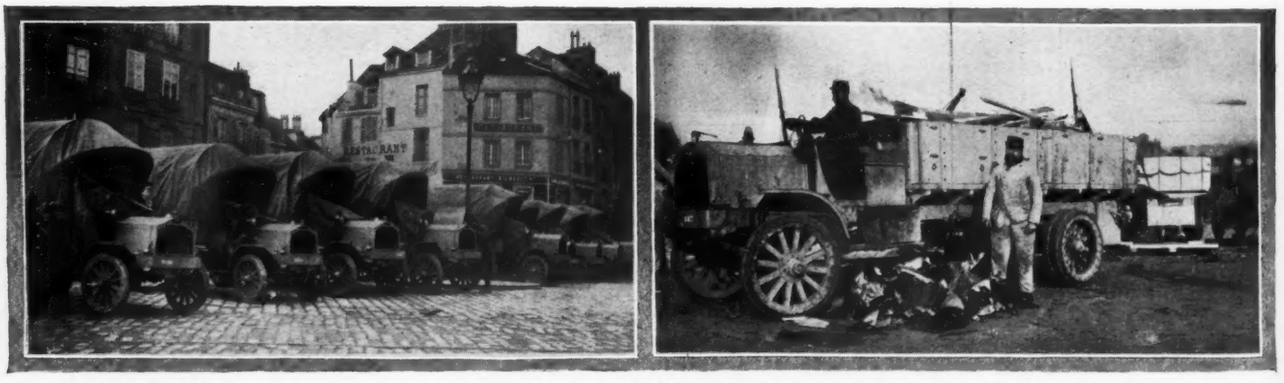
"'I've been thinking that truck matter over,' he said, 'and if you'll drop in at your convenience I think maybe we can get together on a deal.'

"When I had his order for two trucks in my possession, I made bold to ask what had caused him to change his mind.

"'Well,' he said, 'do you know, the way you took that turndown pleased me. I always did like a good loser—and that's you. Besides—there was a lot of good information in that report you left.'"

Motor-Driven Winch Used in Public Service

The hoist is of the platform-drum winch type with enclosed gears; is made in both spur-geared and worm-geared form, and is driven by a clutch connection from the motor shaft of the truck. It can be used either in the form of an ordinary winch, for hauling articles off and on trucks, or in connection with boom and tackle, as shown in cut. The gears are all cut, running enclosed in oil; the drum is machined and is made in various sizes, according to the amount of rope that is to be wrapped thereon. This type of winch is attached to a Packard truck setting light poles for the Public Lighting Commission, Detroit. This winch on this and other trucks has been used for hauling safes, lifting large loads onto the truck, and even for moving houses. They can be applied to any truck, but are usually recommended for those of very heavy capacity. They are made in various sizes, from one thousand to two thousand pounds capacity, single line. This winch is made by Northern Engineering Works, Detroit, Mich.



Commercial Cars for the War

Washington officials have roughly estimated that the commercial car stands fifth in rank of exports, preceded by arms and ammunition, steel and iron, textiles and foodstuffs. The officials stated that as nearly as the files of port reports would permit them to estimate, the European nations have bought $22,000,000 worth of motor vehicles in the United States since the outbreak of war. The illustrations shown above give an idea of how the American trucks appear on foreign duty. The photographs were taken of a convoy of Packard trucks now in the service of the French. One of the views shows the convoy halted in the village of St. Germain, where they were the cynosure of a Sunday afternoon crowd. The other illustration shows one of the Packards doing work under the direction of the camp police.

The CCJ leads in circulation, advertising and prestige

Motor Truck Design and Construction Made Plain

Advantages and Disadvantages of Different Types Discussed

By C. T. SCHAEFER, Member Society Automobile Engineers

This is the fifteenth installment of a series of articles by this well-known writer, covering in a non-technical way the various constructions now current practice in commercial car design. These articles take up, in order, the general types of chassis, the advantages and disadvantages of each, illustrated by simple diagrams, and in logical order, motor construction, ignition, carburetion, cooling, lubrication, etc., until each part of the truck has been dealt with.

PART XV

THE FINAL DRIVE

(Continued from our March issue.)

[The length of this subject will necessitate its being continued through several issues.—Ed.]

An enclosed chain drive is illustrated in Fig. 10. This construction has been used on the Natco one-ton trucks for several years. The case is cast in two parts and well ribbed, so that it can be used as the radius rod also. The forward end carries the adjusting member, which is in the form of an eccentric and provides a spherical bearing to obtain universal action. The rear end pivots about the brake drum, in which are mounted double expanding brakes. The rear wheel hub and brake drum are cast in one piece to obtain proper strength for this construction, since the thrust is transmitted through the brake drum. Ground joints are used to prevent oil leaks, while drain plugs are also provided so that the case can be cleaned at intervals.

The advantages of the chain drive are low cost of changing gear ratios, minimum unspring weight, somewhat greater flexibility, mounting of differential on chassis, where it is protected by the vehicle springs, and greater accessibility, for broken links can be repaired easily. When it is kept clean, oiled and properly adjusted is a very efficient means of power transmission; however, this is quite a difficult problem. This naturally suggests enclosed chain drives which operate in oil, however a practical chain case is a difficult problem, so that many joints and bearings are necessary, which are subject to frequent renewal and in service the chain case soon becomes more noisy than the open drive. It also makes a somewhat inaccessible construction, thus increasing maintenance cost.

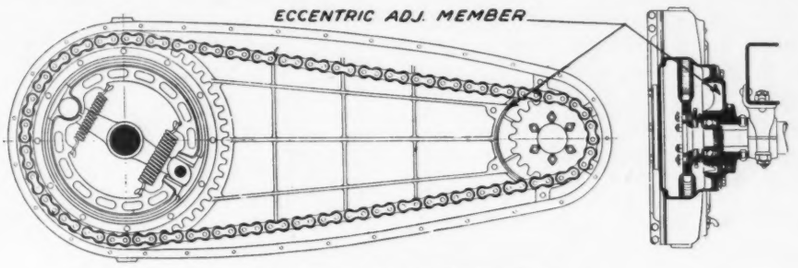


Fig. 10. Enclosed Chain Drive

The case is cast in two parts and well ribbed to allow it to be used as a radius rod also. The forward end is provided with eccentric adjustment

The Bevel-Gear Axle

The bevel gear axle is almost universally used on pleasure cars. However, it is not very popular on commercial cars, being used only on the light vehicles of capacities up to 1500 lbs. Its use is limited, owing to that it is very difficult to provide a higher reduction than four or five to one without sacrificing road clearance.

Fig. 11 depicts the G M C 1500-lb. delivery car bevel drive rear axle, which is of the three-quarter floating type. The axle housing is divided into two halves having tubes riveted into it, which extend slightly beyond the wheel bearing. The differential is of the bevel gear type and mounted on Hyatt roller bearings inside of the axle housing. Ball thrust bearings with ample adjustment are mounted on each side of the Hyatt bearings to take up the thrust load of the gears. The hub is provided with a Hyatt bearing, which is centered under the wheel and is retained by a threaded retaining member which has a funnel shaped part formed integral, to throw off the oil and prevent it from reaching the brakes. The hub is keyed to axle shaft, so that the weight is carried on the housing tube, while the shaft transmits the power. The spring seat swivels upon the brake spider, which also carries the ends of the truss rod. The axle housing has a bracket to support the brake shafts, so that the levers can be mounted close to the center of the axle.

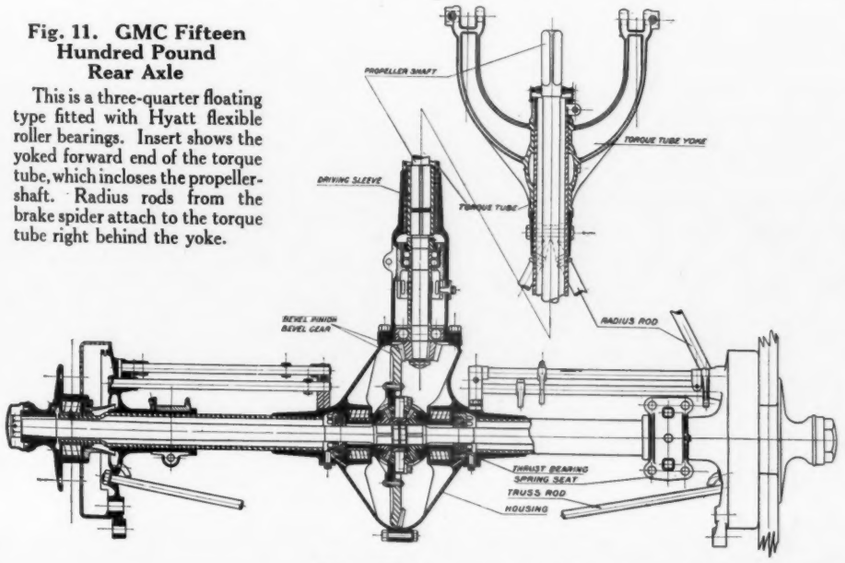


Fig. 11. GMC Fifteen Hundred Pound Rear Axle

This is a three-quarter floating type fitted with Hyatt flexible roller bearings. Insert shows the yoked forward end of the torque tube, which incloses the propeller-shaft. Radius rods from the brake spider attach to the torque tube right behind the yoke.

The CCJ has most advertisers because it gives them biggest returns

The brakes are of the internal and external type and operate on pressed steel brake drums bolted to the wheels. The propeller shaft is enclosed in the torque tube, which is bolted to the axle housing and carries the ball bearings for supporting the bevel pinion, while the pinion shaft and the propeller shafts have squared ends and are connected by a sleeve having a square hole fitting over the squared shaft ends.

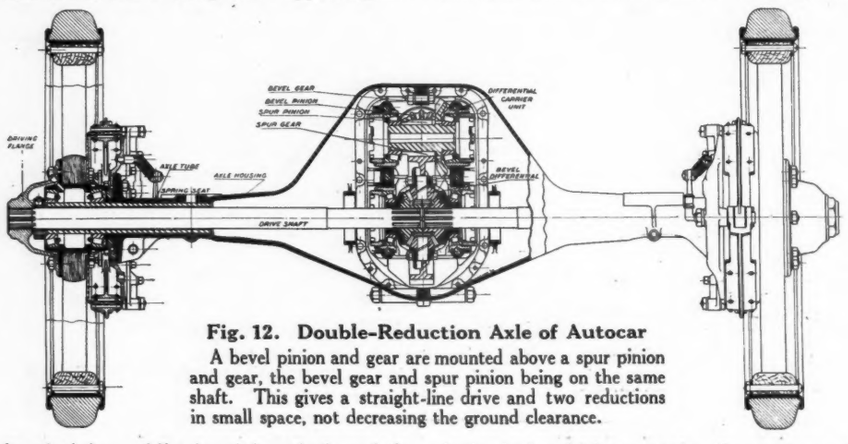


Fig. 12. Double-Reduction Axle of Autocar

A bevel pinion and gear are mounted above a spur pinion and gear, the bevel gear and spur pinion being on the same shaft. This gives a straight-line drive and two reductions in small space, not decreasing the ground clearance.

The torque is taken by the torque tube through a large fork, which is hinged to a heavy cross member, while the spring is free at both ends. Radius rods, running from the brake spider diagonally to a point directly back of the torque tube fork, take up the thrust load.

Bevel gear drive axles of similar construction are also on the Steward, Commerce, Vim and other light delivery cars. They are mostly used with pneumatic tires, where speed is a factor.

Types Intended to Overcome Reduction Difficulties

The difficulty with the bevel gear axle is overcome in the double reduction, internal gear and worm gear axles. The double reduction and the internal gear type use two reductions, one by bevel gears and the other by spur gears, while in the worm gear axle a large reduction can be obtained with a single pair of gears.

The advantages claimed for the double reduction are silent operation, enclosure of all working parts, while the differential bearings are relieved of thrust loads. By mounting one pair of gears above the other, approximately straight line drive can be obtained.

The internal gear drive axle possesses the advantages of silent operation and enclosed working parts. However, the differential bearings are subjected to thrust loads, since the spur gears are mounted in the wheel, and it is also difficult to obtain a straight line drive. They possess an advantage in that this axle is divided into two units, the jack shaft which transmits the power and the dead rear axle which carries the weight. The jack shaft is similar to the chain drive jack shaft and may either be bolted to the front or rear of the dead axle.

The worm gear axle is probably the most simple construction, since it has the least number of parts, can easily be arranged for straight line drive, and possesses the features of silent operation, protection of parts subject to wear and a wide range of gear ratios can be provided without changing the distance between the worm and the wheel.

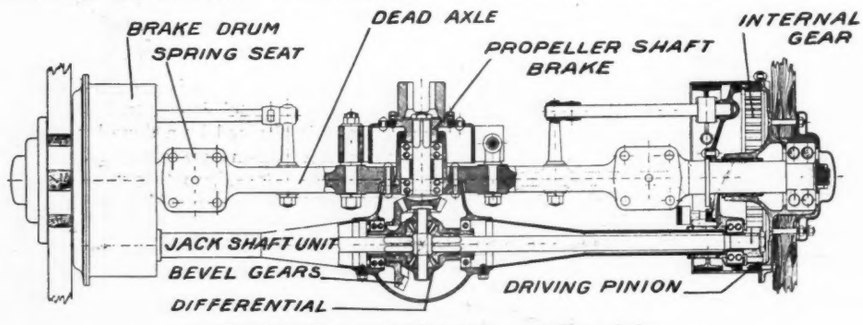


Fig. 14. Fremont-Mais Internal-Gear Axle

Jack shaft placed behind the dead axle, which bears the weight. Jack shaft has bevel pinion and ring gear on differential. The outer ends of the shafts have spur gears, which mesh with internal teeth on a drum on the inside of the brake drum.

All types of shaft driven axles can be made quite accessible so that maintenance can be held within reason. The double reduction and worm gear axles are generally of the full floating type, in which the weight is carried on the axle tubes and the shafts are subject to only tortional stresses, as they only transmit power.

The Double-Reduction Axle

One of the first commercial car builders to use a shaft drive axle was the Autocar Company, which equips all of its one and a half ton models with double reduction axles. Extensive refinements have been made on this axle and it presents an excellent type of double reduction axle. This axle is shown in Fig. 12, and is what is termed a full floating axle, although it is sometimes erroneously called a seven-eight floating axle. The bevel gears are placed above the spur gears so that a straight drive can be obtained, while it also has an advantage in machining the bevel gears, since they are much smaller than they would be if they were used instead of spur gears for the final reduction. The spur gears are better able to take care of the torque of the second reduction and the differential bearings are relieved of the high thrust loads, which they would be required to carry if bevel gears were used.

The axle housing proper is cast in two halves joined together at the center. The spring seats are cast integral and the end of the housing is provided with a flange to which the brake spider is bolted. A reinforcing tube is placed into the housing, which extends a little beyond the spring seat, the end of which carries the wheel bearings. The bevel and spur driving gear and differential are mounted in a unit in the differential carrier and bolted to the housing proper. The drive shafts have splined ends and the wheel drive is taken through flanges bolted to the hub. Internal and external brakes are mounted on the brake drums inside of the wheels.

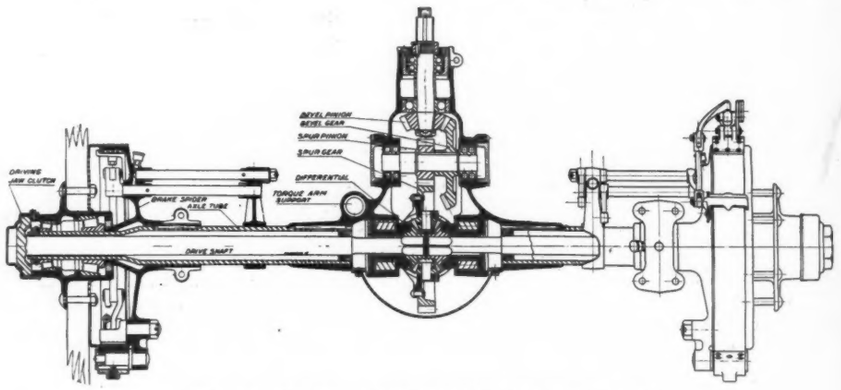


Fig. 13. Weston-Mott Double-Reduction Axle

This has the bevel set mounted in front of the spur set, instead of over it, sacrificing straight-line drive

Fig. 13 illustrates a double reduction axle of 1 ton capacity, which was placed on the market several years ago by the Weston Mott Company, and at present is used on the Menominee, Flint and other light commercial cars. This axle is also of the full floating type, but differs from the one described above in that straight line drive cannot be obtained since the bevel gear set

is mounted in front of the spur gear set instead of above it. The differential carrier has an extension on each side into which are placed the axle tubes, while a large cover is provided for inspection purposes. The brake spider has a hub which is keyed to the axle tube and upon which the spring seat can pivot, while the brake operating levers are also brought inside of the frame. The drive for the wheel is

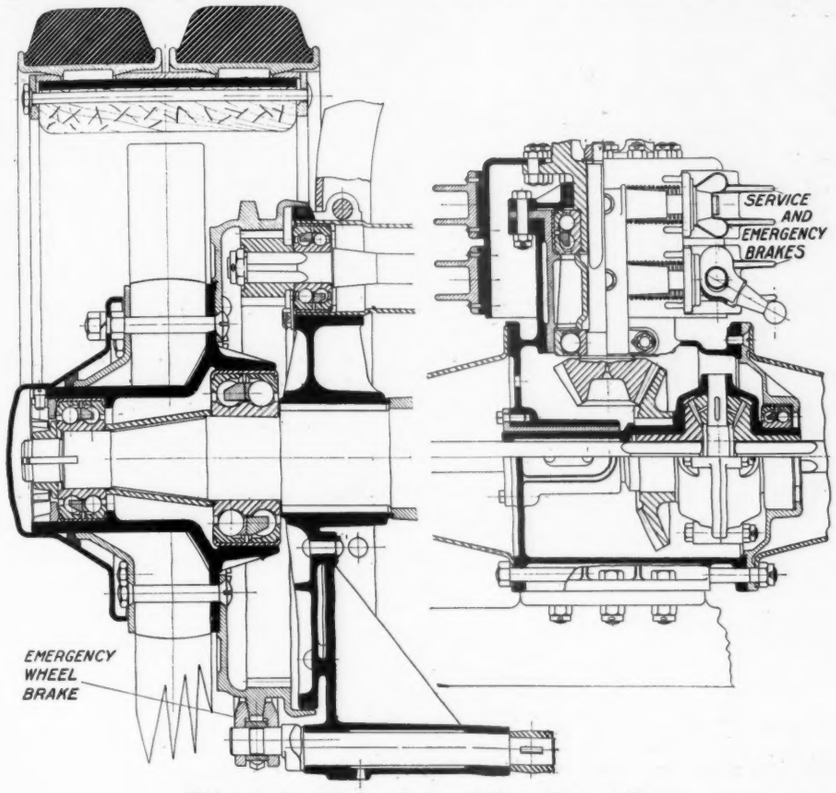


Fig. 15. Studebaker Internal-Gear Drive Axle

The regular foot and hand brakes operate on a drum in front of the bevel pinion. A second hand brake, unratcheted, controls shoes operating on V-shaped grooves on the outside of the internal gears. This arrangement places the regular brakes where no grease can get on them and yet affords the safety of rear wheel brakes, should the regular ones fail.

through a jaw clutch, the male member of which is forged integral with the drive shaft, while the female member is formed integral with the hub.

The Autocar is designed to take both torque and thrust through the spring, while the Weston Mott axle may be arranged with radius rods to take the thrust load and a torque arm to take the torque load.

The one and a half ton White is also equipped with a double reduction axle, which differs from the above in that the bevel gears are in the customary place, as in the pleasure car axle. The propeller shaft, carrying the spur pinion, is mounted above the short shaft carrying the spur gear and bevel pinion. This presents another method of approximating a straight line drive, while both torque and thrust loads are taken by the springs.

The double reduction drive, like the worm drive, will be found on both gasoline and electric vehicles, although its use at present seems to be mostly on vehicles of 3000 lbs. capacity and under.

The Internal-Gear Drive

We can now consider the internal gear drive axle. However, the writer will not attempt to compare the various types, since this is not within the scope of this article.

As mentioned above, the internal gear drive axle is really a double reduction, in which two sets of gears are used. It is also similar to the chain drive in that a jack shaft and dead rear axle are used. However, the two units are bolted together and the sprockets and chains are replaced by internal gears in the brake drums and spur pinions on the drive shafts. Among the users of this type of axle may be mentioned the General Vehicle Company, Fremont Mais, Mais, Denby, Republic and others.

Fig. 14 serves to illustrate the Fremont Mais one and a half ton axle, showing a dead rear axle of I-beam section with integral spring seats and spindles carrying a bronze sleeve and a double row ball bearing upon which the wheel is mounted. The jack shaft unit, carrying the differential, drive shafts and bevel driving gears, is mounted to the rear of the I-beam axle. The housing of this unit is riveted to the axle and supports tubes which enclose the drive shafts and extend into the brake spider to support the wheel brakes. The drive shafts float in the differential and are supported inside the brake spider by a double row ball bearing next to the spur driving pinion. The hub flange is made large enough so that the brake drum can be riveted to it, while inside the brake drum and bolted to the hub is the internal gear. The driving gear, with its bearings is enclosed in a separate compartment formed by the brake drum, spider and hub and works in a bath of oil. One set of brakes is located in the wheel drums while the other is mounted on the bevel pinion shaft and supported from the rear axle. This brake acts on both wheels through the driving unit.

Fig. 15 depicts the massive construction of the Studebaker internal gear drive rear axle which possesses several unique features, having a dead rear axle on which are mounted the bevel gears, differential and drive shafts which comprise the jack shaft, while the wheels are driven through spur pinions meshing with internal spur gears. The whole mechanism is enclosed and felt packings are provided to keep out dust and retain grease and oil in the various compartments.

The principle difference between this axle and that above is the scheme of the brakes. In front of the bevel gear housing is a very wide brake drum on the bevel pinion shaft. On this drum are the two brake bands for foot and ratchet hand brakes, but an additional hand emergency brake is provided not ratchet retained. It consists of shoes acting upon V-shaped ribs running around on the outside of the internal gears on the rear wheels close to the spokes. It is claimed that this construction relieves all brakes from any danger of slipping due to leakage of grease around the rear wheels and yet provides a brake acting upon the rear wheels themselves in case any breakage should put the regular brakes out of commission.

With this axle, triangular channel shaped pressed members, which are bolted to the brake spiders and hinged to a heavy cross member take up the thrust and torque loads.

The G. V. Mercedes gasoline trucks are also internal gear driven. While they are

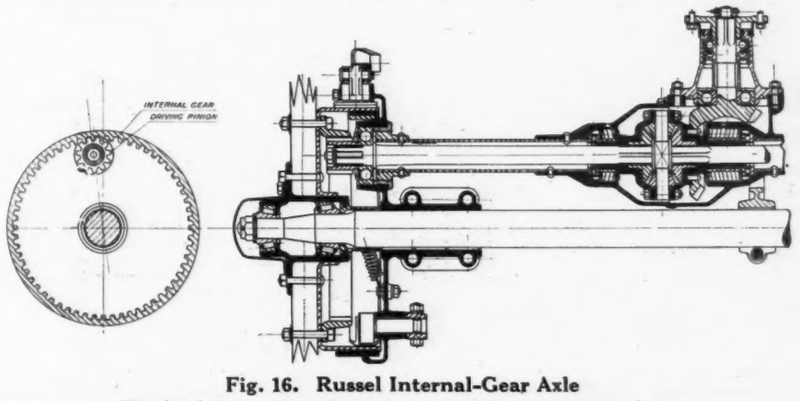


Fig. 16. Russel Internal-Gear Axle

The detailed view shows the arrangement of the spur pinion and gear

The CCJ brings greatest returns to advertisers because of largest circulation among quantity buyers

similar in some respects to the Studebaker construction, the axle is equipped with only one set of brakes, while the other brake is mounted in back of the transmission. They also use the triangular pressed steel members for taking torque and thrust loads, but have a cross member located directly in front of the jack shaft and, bolted to it, the triangular members.

The Russell one-ton internal gear drive axle illustrated in Fig. 16 has a forged steel dead axle of round section with spring seats keyed to it so the torque and thrust can be taken on the springs. The axle is similar to those mentioned above.

There is one feature about the internal gear in that it employs two reductions as mentioned above and is similar to the chain drive. The first reduction is through bevel gears and is such that a low torque is transmitted by the rapidly revolving drive shafts, which permits a light structure for the driving unit. The next reduction, of course, is near the wheels and supported directly by them. The reduction in the wheels is such as to provide a high torque direct to the wheels. By making the jack shaft a high speed unit, considerable weight can be saved. However, it has a greater unsprung weight than the chain drive.

The Torbensen axle shown in Fig. 17, is also of the internal gear type. The dead axle is a one-piece drop forging of I-beam section, with chrome vanadium spindles, and fixed spring seats. The cylindrical end of the dead axle is of large diameter, and extends nearly to the center line of the spokes, so that the bending moment of the spindle is reduced to a minimum. All members of the jack shaft are enclosed, affording cleanliness, efficient lubrication and quiet working.

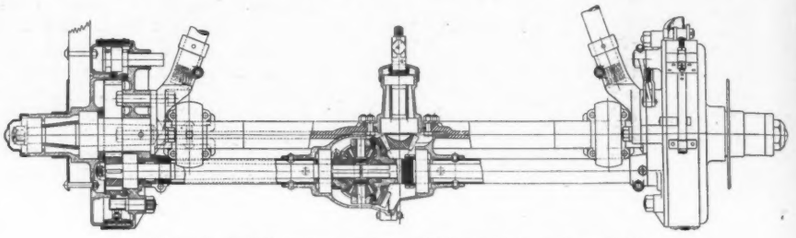


Fig. 17. Torbensen Internal Gear Drive Rear Axle

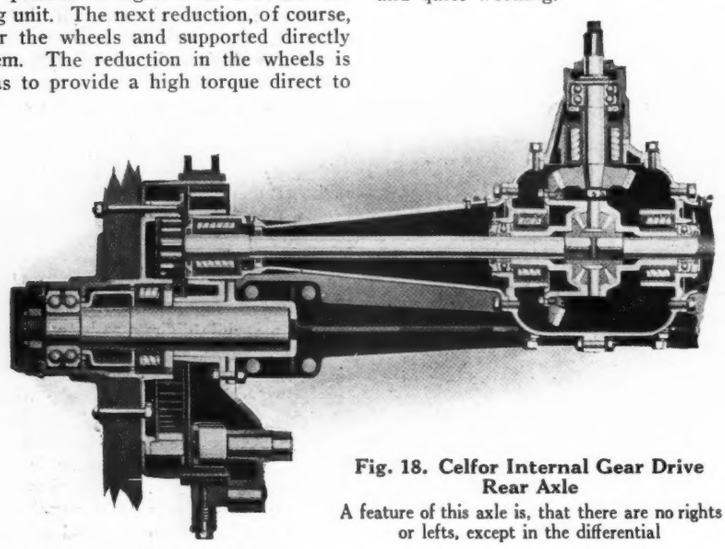
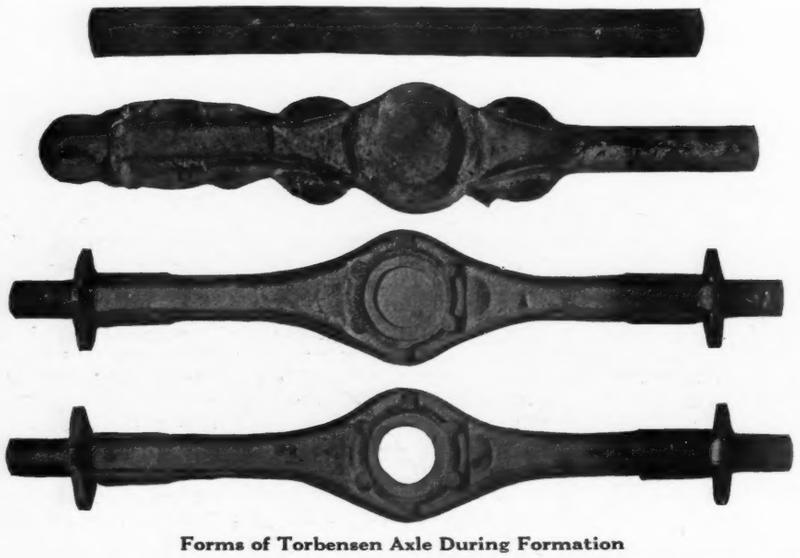


Fig. 18. Celfor Internal Gear Drive Rear Axle

A feature of this axle is, that there are no rights or lefts, except in the differential

In an accompanying cut is shown the processes of forming the I-beam dead member of the Torbensen internal gear axle. This construction results in great strength and longevity. The complete process from the billet to the finished product is shown.



Forms of Torbensen Axle During Formation

The Celfor axle, Fig. 18, is another internal gear type; however, in this design, the dead axle or load carrying number is a steel casting. The spindles are made of nickel steel and heat treated after being brazed into place. A feature of this axle is that all parts, excepting the differentials, are made identical, there being no rights and lefts. The driving member is just in front of the load carrying member. These two are rigidly connected together at the center and ends, forming a box girder construction. The differential and drive shafts are supported on Hyatt roller bearings and ball thrust bearings. The wheels are supported on double row ball bearings.

(To be continued.)

PARCEL-POST DELIVERY DATA FROM INDIANAPOLIS

The three electric delivery wagons used by the Indianapolis Post Office have proven very reliable and it is declared have never failed to perform any service that they have been called upon to do. In point of speed and mileage they have been found ample for parcel delivery, for the requirements in this direction are well within the range of their capacity. In a seven-hour working day, these electric wagons averaged 271.5 parcels in 189 stops over a distance of 18.75 miles. The cost of the day's run, not including the wages of the carrier, was $5.60. The unit costs were as follows:

Stops per mile	$.0602
Cost per stop	.0325
Cost per parcel	.0206
Cost per parcel mile	.000011

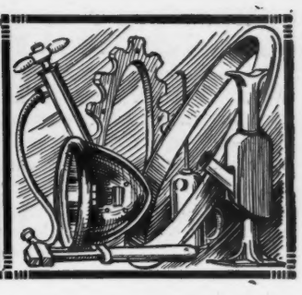
MOTOR TRUCKS FOR FAR EAST

A Government official in the Far East informs an American consular officer that he desires catalogs, etc., from manufacturers of motor trucks. He wishes information direct from manufacturers as to the working cost of motor transportation per mile of such bulky articles as salt and grain. He also wishes to be informed whether the motor will operate efficiently in a temperature of 40° below zero, Fahrenheit. Manufacturers or others interested can obtain further information by writing the Bureau of Foreign and Domestic Commerce, Washington, D. C. or its branch offices, mentioning file No. 16060.

Portland & Suburban Auto Transit Company, Portland, Ore., incorporated with a capitalization of $200,000 and will operate fifty 'buses with seating capacities of thirty to forty persons. They will cover the city and also give service to parts of the city not now served by the street car company. They will also have cars operating along Columbia Highway, east of Portland, and to the west along the Williamette and Columbia Rivers during the summer.

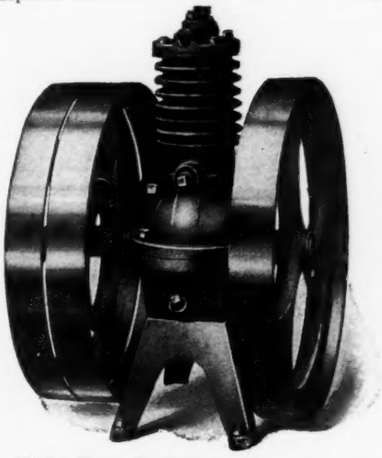
The CCJ is the only truck journal a member of the Audit Bureau of Circulations—Why?

TRUCK ACCESSORIES AND APPLIANCES



GLOBE AIR COMPRESSOR

The Globe Manufacturing Company, Battle Creek, Mich., calls attention to its latest type D single stage compressor in which are incorporated several desirable features. Especial attention is called to the bearings.



Globe Type D Garage Compressor; Price, $25

Every bearing, including piston end of connecting rod, is adjustable to take up wear and the provision for such adjustment is more convenient than is usually found in small compressors. They are of anti-friction type, self-oiling. For instance, to take up the main crank shaft bearing it is only necessary to loosen a single lock nut, adjust a single set screw and retighten the lock nut.

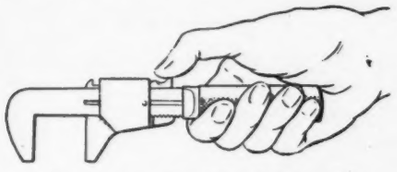
The compression valves, which are hardened tool steel, are arranged for vacuum as well as pressure. The intake valve is tapped for pipe connection to a vacuum tank, so that the compressor can be used for both vacuum and pressure without making any alterations. The bore and stroke are 3 in. Capacity, 3 cu. ft. per min. at 250 r.p.m. Price, $25.

LILLICH WHEEL FENDERS

A noteworthy construction on this fender is the guard over each front wheel, in addition to the net arrangement. The fender swings with the wheels, does not interfere with the steering of the car, cranking or working of the motor, removing the wheel or changing of tires. It is practically out of the way of all interferences. Car will mount or descend uneven grades in the street without injurying the fenders. The fenders are carried axle high, or can be carried any height desired by the driver by regulating lever which raises the fenders. The lower part of the fenders are elastic and do not break. They are tripped by a pedal on the toe board. The manufacturer is Charles H. Genth, 2005 W. Oxford Street, Philadelphia, Pa.

BOSTON AUTO WRENCH

A new self-adjusting automatic grip, one-hand wrench has just been placed on the market by the Boston Wrench Company, 31 State Street, Boston, Mass. The wrench is operated by placing the thumb on top of a protuberance, by means of which, with one finger, the wrench can be pulled open. Place the wrench over the nut, release the thumb-pressure, and the jaws automatically close on the nut, ready to grip the instant



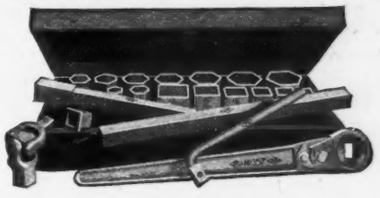
Automatic One-Hand Wrench

pressure is put on the handle. Pushing forward the projection with the thumb fastens the jaws so that the wrench can be taken off and put on again, and the jaws remain in proper adjustment. After removing the wrench a slight pull on the projection by the thumb of the hand holding the wrench releases the jaws.

These wrenches are packed in sets of two, one 6 and one 8 in., and sell in nickel finish at $2 per set, and in blued finish $1.75.

NEW MOSSBERG WRENCHES

The Frank Mossberg Company, Attleboro, Mass., having had constant calls for a wrench set containing large size sockets, has developed a new set, No. 20, which contains the following: 18-in. ratchet socket wrench handle, No. 357; offset socket wrench handle, No. 324; 2½-in. extension tube No. 347; 10-in. extension tube; 18-in. extension tube, No. 349; universal joint for indirect adjustments, No. 337; connection

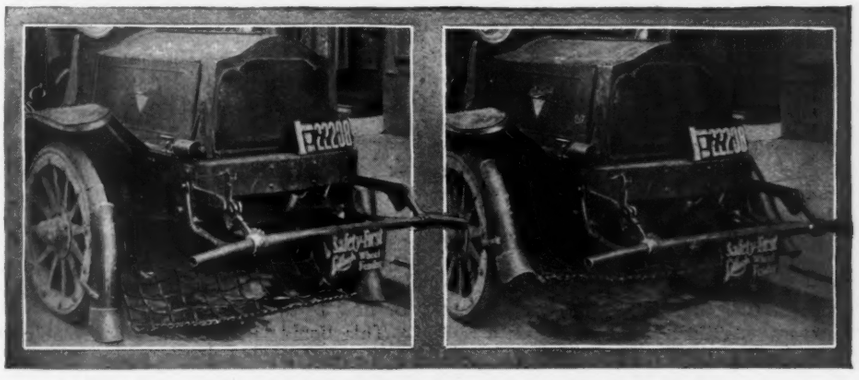


Mossberg Heavy-Duty Set; Price, $18

bushing for small series sockets, No. 338; fifteen heavy-duty, mottled, thoroughly hardened, pressed steel sockets, of which nine are hexagon, ranging in size from 29/32 up to 2 13/32 in., and fitting bolts from ½ to 1½ in. The other six sockets are square fitting, and will fit ½ to 1¼-in. bolts. The price of this set is $18.

Mossberg Socket Wrench Set No. 14; Price, $12

A smaller truck set catalogued as No. 14, lists at $12. This set is fully equipped It contains besides the necessary handles, extensions and special wrenches, 23 sizes of thoroughly hardened and mottled finished hexagon socket, and 11 sizes of thoroughly hardened and mottled finish square sockets.



Lillich Wheel Fenders in Both Positions

THE VALUE OF A RADIATOR HEAT INDICATOR

The Motometer Company, 1790 Broadway, New York City, maker of the "Motometer," a radiator heat indicator which has been adopted as standard equipment by a number of pleasure car manufacturers and used extensively on speed cars, calls attention to the particular value of such an instrument on commercial cars. In speaking of the value of a radiator heat indicator, the company states the following:

"To know the full value of a radiator heat indicator, it is but necessary to compare the winter gasoline mileage of a truck with the summer mileage.

"It is a well-known fact that gasoline of the present low grade requires more heat to properly vaporize it than in former years, and if, during the cooler months, the cylinder walls are not maintained at the proper temperature, condensation takes place and the heavier particles will pass through the motor in liquid state without developing any power.

The "Motometer"

By removing the fan belt and varying the opening in the radiator cover according to the reading of the heat indicator, it is perfectly possible to accomplish a material saving in gasoline. During the 6 cooler months this will often amount to over 30 per cent. However, without such an instrument, the driver seldom covers half enough of the radiator to accomplish any appreciable economy. From the efficiency standpoint, the instrument is an effective preventive of fuel waste due to overcooling.

In the matter of "overheating" the instrument is pretty generally misunderstood, and it is our desire to correct the impression that a heat indicator is solely useful on cars that overheat habitually, for the fact is that on such a car it is practically useless. It is primarily useful for cars that, under normal conditions of operation, will cool properly and never overheat, except when something becomes radically wrong with the cooling system. In short, a car which normally operates well below the boiling point, should not suddenly start to overheat any more than the human being should suddenly start to have fever.

Granting that the cooling system is perfectly designed, it is still possible to overheat any motor and cause expensive damage through the element of human carelessness. A leaky hose connection, a radiator drain shaken open on the road, a bit of waste carelessly dropped in the oil, are but a few of the possible causes of overheating that occasionally happen to any cooling system. To trust the driver to detect overheating, is like trusting a doctor to detect typhoid fever by looking at the patient. It is at best a "guess," and if the driver guesses wrong, just once, a costly repair to scored cylinders can be the only result. A heat indicator warns him miles in advance before any such damage can possibly take place.

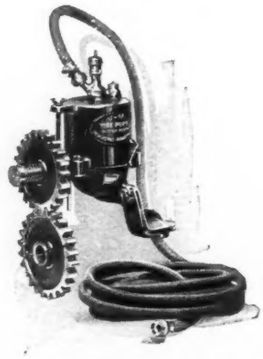
"The Motometer is particularly valuable to fleet owners, whose costly property is not under their direct supervision, but in several different sets of hands. It is but human nature and to be expected that an operator, continually alone while driving a motor truck, will not—though with the best of intentions—use the same vigilance in the care of the owner's property as he would in the care of his own or while under immediate direction.

A radiator thermometer will increase mileage by eliminating overcooling, and it will decrease repair expense by eliminating overheating.

In view of these facts and after exhaustive tests, the Motometer is now supplied as regular equipment on every commercial car manufactured by the Packard Motor Car Company.

NEW J-M ENGINE-DRIVEN TIRE PUMP

An engine driven tire pump has just been marketed by the H. W. Johns-Mansville Company, of New York City, which should appeal to truck owners on account of its simple design and low price. This pump is permanently attached to the car and is operated by simply throwing a gear into mesh and starting the engine. The pump will inflate a 34x4 in. tire in 2½ minutes and a 30x3½ in. in less than a minute. The pump weighs 4½ lbs., measures 3¾x3 in.; has a bore of 2¼ in. and a stroke of ⅞ in. It lists at $7.50.



New J-M Engine-Driven Tire Pump

A NEW RADIATOR-REPAIR LIQUID

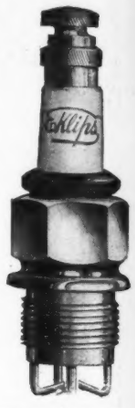
The "X" Laboratories, 630 Washington Street, Boston, Mass., manufacture a new radiator repair liquid which is poured into the radiator and is said to stop a leak in about 10 minutes, no matter where located or how bad.

This liquid is also said to prevent corrosion and eliminate scale. It lists at $1.50 a can, which is enough for two radiators of the average size.

THE EKLIPS SPARK PLUG

Many new and ingenious features are incorporated in the new line of spark plugs which the Fulton Company, of 726 National Avenue, Milwaukee, Wis., is now placing on the market.

A noteworthy construction is the shape of the electrodes, which are so shaped that oil runs to their lowest point to drip off, thus running away from the sparking point. The central electrode extends below the sparking point, so that oil cannot prevent a good spark. The petticoat is kept well back from the points, giving a chamber within the shell, serving to clean the plug at each explosion.



Eklips Spark Plug

The porcelains are imported, hand turned, and are insured against breakage by a series of spring washers.

Electrodes are of special heat resisting alloys, preventing fusing or floating.

Where heat or oil conditions require, a mica core can be furnished, this having strips wrapped around the central electrode, in addition to the usual washers.

The electrodes are extended ¼ in. below the shell so that the spark occurs in a body of fresh gas. Four types put out in porcelain insulation list at $1.25, $1, $.75 and $.50. Two mica types list at $1.25 and $1.

N. A. C. C. STANDARDIZING TREADS

In response to the insistent demand from southern dealers, as well as from the manufacturers generally, an effort is now being made by the National Automobile Chamber of Commerce to bring about the standardization of vehicle tracks in this country, which, of course, will mean lower manufacturing costs and, ultimately, lower list prices to buyers of cars. One of the difficult things in the making of motor cars has been to care for the wide treads which some parts of the South have deemed necessary. Now comes a demand from the legislature for standard tracks, while the carriage and farm wagon manufacturers are appreciating the advantages that would come from standardizing the tread of 4 ft. 8 in.

The Committee on Standard Treads, consisting of Messrs. Nash, Pelton, Drake, Benson and Jameson, is now arranging to have a conference with the representatives of the National Implement and Vehicle Association and the Carriage Builders' National Association.

Goodyear Tire & Rubber Company, Akron, Ohio, purchased fifty tire applying presses, each of 150 tons capacity, for use in applying motor truck tires of the pressed-on type. The presses are being distributed among the Goodyear branches all over the country and among the larger dealers handling Goodyear tires. The machines have been bought with particular reference to use in applying the new Goodyear S.V. tire.

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Important New Fuel-Producing Process Likely to Influence the Supply Question

By OUR FOREIGN CORRESPONDENT

IN both Europe and America of late years many new fuels, or fuel production processes have appeared, and each by its claims has attracted much attention. None, however, have been able practically to substantiate anything like their full claims, and this may be the reason why the motor press in England has apparently failed to realize the importance of a paper recently read by William A. Hall before the Institution of Petroleum Technologists in London. Yet the new method of "cracking" outlined by Mr. Hall may have a very important bearing on the whole future of the motor fuel supply: indeed, it is not too much to say that Mr. Hall's system constitutes the most important discovery made for many years past in this particular branch of industry. And it is the more valuable in that it is the result of experiment carried out with a plant of commercial size. What this means will be appreciated by those who have had experience of the divergencies between laboratory experiment and commercial working.

Some Notes on "Cracking"

Our readers are no doubt aware that the cracking of heavy oils has during the last 2 or 3 years come to be regarded of more and more importance, though to what importance it has attained few realize. It is only about 2 years ago that the Standard Oil Company started it on a really commercial scale with a few small stills at Whiting, Ind. At present they are operating several hundred 200-barrel stills in the conduct of that process. This output has had a most material effect both on the volume and price of gasoline.

We may summarize Mr. Hall's paper as follows:

The term "cracking," which was originated some 50 years ago by the still men in the old Pennsylvania refineries, denotes a partial alteration of the molecule, as distinct from a more complete decomposition which would mainly disrupt the molecule into carbon and permanent gas. It simply alters the molecule sufficiently to produce a number of low-boiling fractions that cannot be obtained by simple distillation, and may, or may not, be accompanied by any considerable production of permanent gas. An oil, such as gas oil, cannot be cracked to yield any large percentage of converted product without considerable production of fixed gas and consequent deposit of carbon.

Now objections against decomposition of carbon are obvious, and though in "cracking" methods the excess gas is usually calculated as fuel for operation, it is a very expensive fuel for the purpose, and considered apart from this the permament gases must be regarded as more or less a loss.

There are practically two methods of cracking, the one being carried out in comparatively large stills, the other in tubes.

Cracking in Stills

In the first method a large volume of oil at a slow speed of flow is subjected for a considerable time to a high temperature in the still. The objections against such a method are that, owing to the size of the still its interior is at a lower temperature than the outer sides. Consequently, action is local, and large portions of the oil get rapidly volatilized and then are re-condensed, while certain portions of the vapor pass immediately out of the still unchanged, as a simple distillate. Such a process is also slow, entails a large expenditure of fuel in comparison with the amount of converted spirit, and offers great difficulties against obtaining uniform results.

Condensation under pressure greatly helps the yield and quality of the product. This is a method described in the Burton patent used by the Standard Oil Company. It is claimed that the spirit derived by this process is derived largely of the paraffin series, and Mr. Hall referred to an affidavit that was presented to the United States patent examiner, in which the sulphuric acid absorption of the Burton distillate was given as 20.2 per cent., and the iodine number as 97 against 49.4 and 200 respectively on a similar cracked distillate condensed without pressure. But cracking processes carried out in large stills or in vessels of large diameter have the objection of being dangerous.

The Tube Process

On the other hand the tube cracking process is one of continuity, of comparative safety (even if a joint or union blows out it is only discovered by the gage on the receiving tank, or by the high temperature pyrometer), lower cost of plant per gallon run through, and far greater fuel efficiency.

The chief difficulty lies in the deposition of carbon, which is always present more or less, the deposit varying with the extent of conversion, and with the nature of the oil employed. In any case provision must be made for the speedy and efficient removal of carbon.

Some of this carbon is sure to be deposited in the tubes, and though it may not be noticeable after a run of a few hours, continuous running will surely reveal it. It is much more pronounced when the cracking operation is conducted at low than when conducted at high pressure; at a slow speed of flow than at one of great rapidity.

The Hall Process—Speed Energy Converted Into Heat Energy

By Mr. Hall's process the oil is fed under 50- to 75-lb. pressure to the sq. in. through 1 in. tubes of more than 300 ft. in length, the vapor being so throttled that its speed through the tubes permits 70 gal. an hour passing through the tube. The oil is first vaporized in a coil, preheated in the flue by waste heat from the furnace, so that it enters the cracking tubes at a speed so great that very little deposit can be formed to choke the tubes or interfere with cracking action. But as the passage of the vapor through the tubes only occupies about three seconds, no very extensive cracking occurs. Through a very confined space acting as a throttle, the vapors then pass into a vertical pipe some 12 in. or more in diameter, and about 12 ft. high. Here under the normal process they would expand with a resulting fall in temperature, but by Mr. Hall's method they preferably impinge against a baffle so that their speed of flow is incidentally reduced to a merely nominal rate. This converts the energy of speed into the energy of heat—a sort of degrading action similar to that which takes place in a throttling calorimeter—and consequently the temperature actually increases some 54° F., notwithstanding the expansion. Hence in this large pipe we have a temperature well above that existing in the small tubes of the cracker, and as the speed through the former is comparatively slow, a large amount of cracking takes place therein without any extraneous application of heat and without affording a chance for the vapors to be superheated to a higher temperature than that at which cracking takes place. By this method we get a heating effect exactly the reverse to that in a still, for the interior of the container is hotter

The CCJ has most readers because it gives most information

than the exterior walls. Also the vapors in their upward passage, work towards a cooler condition and prevent superheating, which has always been responsible for the largest amounts of fixed gas from what would otherwise have been condensable product of the character most desired in motor spirit. To collect any carbon deposit, this big pipe is filled with fragments of 1-in. lengths of thin ¾-in. piping, which can be easily removed, after which the carbon is burnt off in a small furnace devised for the purpose.

Another Vital Point and a Strange Phenomenon

On leaving the latter receptacle and having passed through dephlegmators to separate all fractions boiling below the chosen point of cut, the vapors and gases are led without further condensation, and at a depression, into a compressor working at 70 to 100 lbs. per sq. in. They are then condensed through a cooler under that pressure, firstly (this is the least important reason) to draw the vapors at substantially atmospheric pressure through the secondary cracker and dephlegmators; and secondly to attach chemically to the condensable liquid the gases that would otherwise be permanent. Obviously in this taking up of the hitherto permanent gases we have one of the most important features of the process. That any chemical combination between such gases and liquid could thus take place has provoked much question and skepticism, but it has led to very extensive tests, which have now, I believe, established to the satisfaction of some of our leading experts the fact that an actual and improved chemical action does take place.

On the Qualities of Cracked Spirit

As to the quality of the spirit produced by any cracking processes, there has been much prejudice, principally on account of its odor. In this respect a great deal depends upon the oil used and the method of applying heat. If there has been extreme local heating in its production, the spirit is almost certain to possess a very objectionable odor, even though it be far less unsaturated than a spirit cracked at a high but more uniform temperature. Much, too, depends upon methods of refining. For instance, a cracked spirit refined by sulphuric acid is much sweeter than the same spirit refined with fuller's earth, though in this matter it must be realized that some cannot be satisfactorily refined with fuller's earth, whereas others are extremely responsive to such treatment.

The author expresses opinion that by cracking, a spirit entirely free from any objectionable odor can be produced. For several thousands of miles in several motor cars he had used such spirit without any trouble in sooting, smoky exhaust or smell, provided a sufficiency of air was supplied to produce the best explosive mixture.

"It is absolutely certain," says Mr. Hall, "that spirits can be produced by cracking that have no more odor than the standard gasoline." Moreover, he claims that any cracked spirit will give more mileage than gasoline, and as a result of many extensive tests both on bench and road he puts the figure of economy at 15 to 20 per cent. by volume (not by weight) in favor of cracked spirit. This is put down to the freedom from pre-ignition (particularly in modern high compression engines) and to the consequent possibility of keeping on in one gear without changing down.

Though this treatment is as yet in its infancy, it must play an important part in many countries, especially where, as in the majority of the newly developed fields, the oil is deficient in low-boiling fractions and could not yield sufficient gasoline to keep pace with every increasing demand, unless larger quantities of the heavier fractions were produced than could be profitably marketed.

The Possibilities of Localized Fuel Manufacture

Cracking also enables the production of gasoline in any country, close to the consumer, and the transport of heavy oils with high flash-points costs much less than the carriage of the more unstable and dangerous products, to say nothing of the loss by evaporation of the latter—in itself a considerable item.

As nearly as the author can calculate, a gas works can produce a motor spirit by cracking at about $.04 a gallon less than it can be done in a plant solely conducted for the purpose. To this can be added at least $.02 saving in transportation, and probably $.03 in selling cost. This really means that as a by-product the same could be produced at a gas works at the very point of its consumption for about $.10 a gallon. It is difficult to see how even the greatest organizations, with all their distributing facilities, could meet such a competition in direct conflict, for the gas works could afford to shut off its motor spirit production for a period, if prices were not remunerative, and this without disrupting its organization or leaving idle any considerable plant; and this would not be the case for the competitor. Under such circumstances, low unprofitable prices would not be likely to continue for long, and when the trade returned to a profitable point the gas works could quickly and economically resume its operations. It would be practically impossible for even the strongest combination to "freeze out" competition of this kind, nor could they do it by controlling the raw material, for there are altogether too many producers of crude and residual oils anxious for a market.

To sum up, Mr. Hall makes out a strong case for the need of localized fuel manufacture, the possibilities that the cracking process has in this direction, and the consequent need for perfecting that process. How far his own work carries in that direction is for time to show, but there are sound technical reasons for believing that, given good business management, the new development will exercise a quite important influence on the fuel supply question.

New Fuels for German Automobiles*

On March 15th, in accordance with a recent order of the Bundesrat, about 25,000 automobiles will cease operating in and about Berlin. This step has been taken to conserve the supply of benzine,[1] benzol, and rubber.

Many German technical men are of the opinion that in a very short time a great variety of fuels will be used in automobile engines—fuels that up to the present have been used only for stationary explosion engines. They believe that conditions brought about by the war will result in discarding the more expensive motor fuels, especially benzine.

It is stated by the same authorities that pure benzine has not been used for years, having been superseded by a fuel originally known as "mononaphta," in which the pure benzine is mixed with other oils. This mixture has come to be known as "benzine," "automobile benzine," or "heavy benzine." Motors have been adapted to this heavy fuel. Benzine would have been replaced long ago by benzol, which is a coal-tar product, if the manufacturers of benzol had not bound themselves by deliveries to foreign countries. However, many automobile owners still believe that the use of benzol is harmful to their machines.

Tests With Mixed Fuels

Much interest has been taken in the subject of mixing the materials now available in reasonably large quantities. The use of pure petroleum or pure alcohol is not considered, as the supply of neither can be considered unlimited. Regarding the use of mixtures, the following information has been obtained:

Benzine and benzol can be mixed with petroleum as well as with alcohol, and four different homogenous fuels can be produced by such mixing, namely, (1) benzine-petrol, (2) benzine-spirit, (3) benzol-petrol and (4) benzol-spirit. As benzine and benzol may also be mixed, the four mixtures mentioned may also be mixed—(1) with (3) or (2) with (4). In this way fuels can be obtained that are composed of three of the original fuels—benzine-benzol-petrol and benzol-benzine-alcohol. These two liquids, as well as the four first named, are perfectly homogenous.

Tests have been made with the mixtures of benzine and petroleum, and it was found that no changes in the ordinary motor were required. When alcohol was added, however, a perforated lead disk was attached to the float, and an especially effective warming mechanism was attached. The benzine-petrol-spirit can be used to the last drop, with the motor always working well. Mixtures of half benzol and half alcohol and of one-fourth benzol and three-fourths alcohol have been tested with less satisfactory results, although with some changes, including the elimination of the ventilator, real progress is being made.

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* From a report by Vice-Consul Daniel J. Waters, Berlin, dated March 6th.

[1] In this report the word "benzine" is used in the continental manner and refers to the motor fuel known everywhere in the United States as "gasoline." When referring to motor fuel, the "benzine" of the Continent, the "petrol" of Great Britain, and the "gasoline" of the United States are synonyms for the same petroleum distillate.

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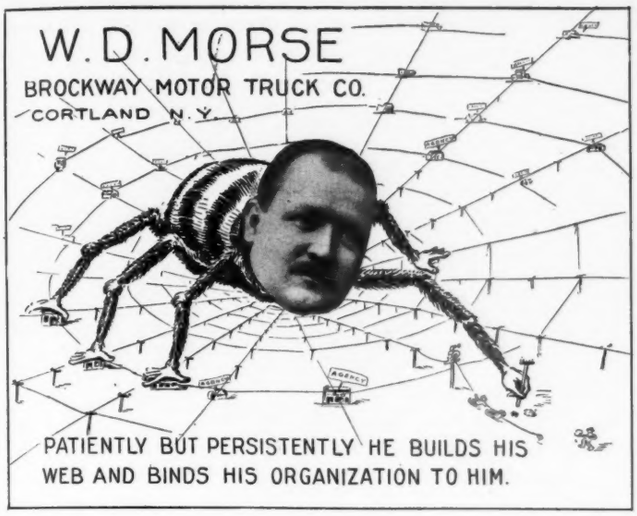
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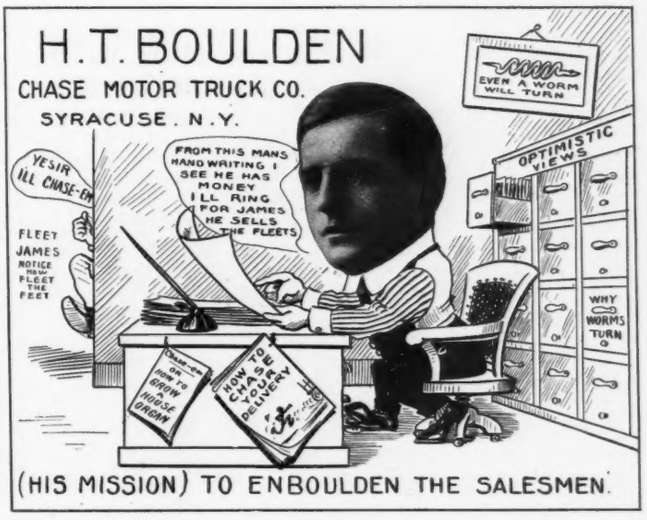
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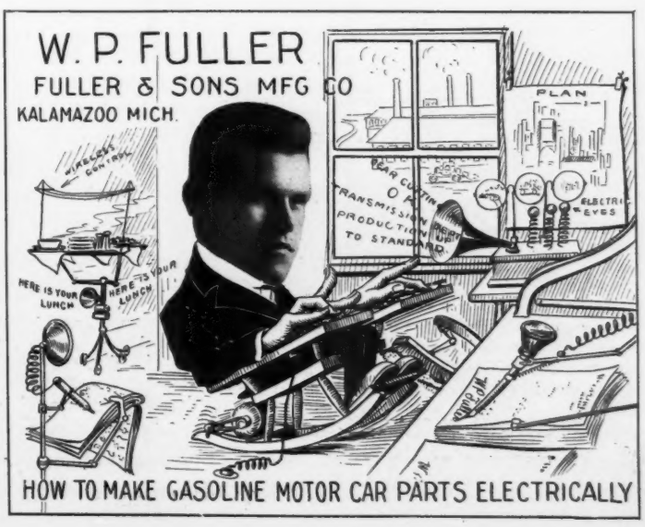
OPTIMISTIC VIEWS
WHY WORMS TURN
HOW TO CHASE YOUR DELIVERY
(HIS MISSION) TO ENBOULDEN THE SALESMEN.



Care and Maintenance of Motor Trucks*

THERE has been entrusted to a committee, of which I have the honor to have been appointed chairman, the preparation of a paper upon the care and maintenance of motor trucks. These are matters of great interest and importance to all users of motor trucks, and as one having the direct care and upkeep of a fairly large fleet of various makes, I can say that while there are some few fixed rules which must be followed to secure even the semblance of results, there are individual problems to be overcome in the case of each one of us. It is probable that in the main our problems are much the same; it is also likely that that which becomes one man's big trouble is of lesser moment than something else to his neighbor. We will therefore endeavor to look at the question in the light of our own experiences.

Lubrication

Lubrication, possibly, is the most important point; certainly it applies to all, although some owners have been particularly fortunate in having secured a man to drive or take care of the truck who was first trustworthy, and secondly competent. Trustworthy first, because upon being instructed he could be depended upon to perform his duty thereafter. There can be no valid excuse made where any motor truck fails to perform its work through lack of proper lubrication of all its parts. There are few if any trucks now built, which, when adapted to the work and properly cared for, will not be highly efficient in results.

All motor truck builders now place particular stress upon, and direct owners' and drivers' attention to, the proper lubrication of trucks—in fact, some have very elaborate charts illustrating points to be taken care of and how. Of course, in the case of those who have purchased these particular trucks, little need be said, as these instructions are based on the experience of those who know them intimately. I might call your attention, however, to the necessity of a regular changing of the oil in the crankcase of your motors. This is because all oils in use in internal combustion motors lose considerable of their lubrication qualities, and also in time become impregnated with minute particles of metal and dirt; they also become carbonized to a greater or less extent. The mere addition of fresh oil continuously will not answer; this practice but puts off the day of reckoning.

Drivers

While in most instances trucks receive more or less intelligent and careful lubrication of motors because drivers quickly learn that no oil, no work from motor, it is to be regretted that such is not the case with the balance of chassis. This is due to several causes, the first and principal one being negligence; the second, ignorance; the third, indifference; the fourth, which we fear is more prevalent than is commonly known, is lack of sufficient time daily being allowed the driver to properly do so.

Taking up the first reason: The indolent driver soon finds out that his truck will stand an enormous amount of abuse, and thereupon decides that the lubricating will do some other time—or something to that effect. This man, it is to be hoped, is soon found out and excused from further troubling. The second reason, ignorance, is a condition which of course will always be more or less with us, but can be more easily overcome than any other. Third, indifference: This, like the first, will soon show for itself in more ways than one, and can be overcome in various ways. The fourth, lack of time, is, we believe, a serious one. It involves a great many phases which we have not now the time to go into detail. I would like to say, however, that careful and systematic lubrication of all chassis parts—some of which are unfortunately quite inaccessible—will well repay any truck operator or owner in the added dependability of his truck and the decreased cost of maintenance.

As an illustration of the truth of the above, I wish to show you some interesting figures taken from our own records. They are of three cars of a well-known make which have done substantially the same work and mileage:

	No. 1	No. 2	No. 3
Gas	.0463	.0527	.0367
Oil	.00248	.00373	.00231
Repairs	.0293	.0315	.01384
Tires	.0538	.0532	.0523
	.13188	.14113	.10515

In the case of the driver of the No. 3, who is a very conscientious and methodical man, you will note his running expense per mile is consistently lower for all items. And it is of great importance to emphasize the fact that when his machine was taken down for a general overhaul, it required less than half the replacement of parts due to wear than was the case with either No. 1 or No. 2.

We might divide the maintenance question into two classes: Large fleet owners and the individual owner or those who have a single truck or up to perhaps half a dozen. In the case of the large fleet, there can be no doubt that same should be put into the hands of a competent man and cared for largely upon the owner's premises. The smaller installations cannot afford the overhead expense, as a rule, involved to do this, therefore must depend upon the drivers to a very large extent, and upon such service stations as the agent of their truck maintains. This works out very well in a great many cases, but in others the combination of indifferent drivers and poor service stations has probably produced more discouraged and disgusted owners than any other cause.

I believe that the spirit of our organization is to eliminate as far as possible these conditions—in the case of the driver, to instruct, and in the service matter to have a get-together feeling and help each other in our problems.

At present it is appropriate, I think, to mention the system now in use by me, and which I believe is followed in general by a number of others. It involves a careful inspection of the truck upon its return to the garage after each day's work; also a written and signed report of driver of any deviation from the normal condition of the car as noticed by him during the day, and immediate correction of faults, if any, on the principle that "a stitch in time saves nine." The car is also washed thoroughly at least once a week. In addition to this, there is a thorough overhauling and painting after about 15,000 miles, this distance seeming to work out very well in a number of cases coming under my notice.

It is not amiss at this point to touch upon the matter of cost keeping or records. It is likely that a large proportion of those owning and operating motor trucks do not keep any sort of systematic records of the performance of their vehicles, as evidenced by observing the great many trucks on the road which are obviously not paying their owners because of their poor condition and also the manner in which they are being handled—or, I should say, perhaps—loaded and routed. It is probable that this matter will form the basis of some future paper in our club.

We are all of us interested, of course, in tires. I wonder how many of you, after purchasing your trucks and having worn out your first tire—usually far short of the guaranteed mileage—have had your tire man tell you that your tires would not give you mileage as they were not large enough to do so, even though they were sold to the manufacturer of your car originally to carry no more than you load upon your truck, and, after being convinced that he was right and putting on the next larger size, have found that at about the same mileage, or only slightly more, that it also was worn out. I might say this has been somewhat the experience I have been through.

I observed early some peculiar results, which have apparently attracted the attention of tire manufacturers recently, namely: In our service we had a number of different makes and styles of tires performing practically the same work and under the same conditions, the mileage, however, being at a great variance. One make was of a high, rounded section; others of flat, wide section. Our experience has been that we received always a very great many more miles for the high, rounded tire than we received for the others. Also, I noted that our maintenance expense upon such parts of truck as were subject to road vibration was very much less in case of the high, rounded tire. The above does not seem to have depended so much on the make of the tire as on the form. In the past few months we have had occasion to change the flat form as made by one company to the rounded high type manufactured by the same concern, and have been able to secure the same results as before mentioned.

In connection with the tires I should like to call your attention to the figures before mentioned, as showing the results of careful handling of cars on the road, illustrating the advantage of having the proper man on the truck.

In conclusion, the matter of proper housing or garaging of trucks is one which is of no little concern to many owners. There can be no doubt that it deserves the careful consideration of all. The garage should, if possible, be light and provided with means of heating in winter, these points tending to induce the driver to take better care of the machine; also in winter a car kept in a warmed garage is much easier to start. The garage or place where the car is stored should in all cases be provided with means for washing car. It is surprising how many bolts, nuts, etc., requiring attention show up after an accumulation of dirt has been removed; besides it certainly does not detract from the appearance of the truck.

I believe that most of us realize that our trucks, aside from their utility, are one of the best advertisements we have.

*Extracts from paper presented at semi-monthly meeting of the Motor Truck Club of New Jersey, by J. L. Black, March 9, 1915.

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OFFICIAL ORGAN—COMMERCIAL CAR JOURNAL

The monthly meeting of the Motor Truck Association of Philadelphia was held, Wednesday evening, March 17th, at the Hotel Adelphia, with Vice-President Emlen S. Hare in the chair.

Chief Mechanician George S. Walker, of the Bureau of Fire, was the speaker of the evening. He outlined the requirements of the department as regards its minor equipment. In speaking of some of the old steam apparatus, Mr. Walker said that these engines, in some cases, were capable of throwing more sparks on the top of a three-story building than water.

Mr. Walker said that it required the time of eight or nine machinists in the shops constantly to maintain some of the antiquated apparatus, and that some of these would only deliver 50 per cent. of their rated capacity. Instead of a discharge of 700 gals. of water per minute he could get about 350. The chief pointed out the fact that good fire departments were always obtained after some big calamity. The Baltimore fire was an illustration.

About $2,800,000, he declared, was needed to properly equip the city with modern machines and urged all the members of the Motor Truck Association to use their efforts to get their councilmen to put such a bill through the city legislative body. He said the city, with an area of 140½ sq. miles, had fifty-seven engine companies, equipped with sixteen trucks. The chief also spoke about several department stores, hotels and other buildings not being safe structures against fire.

Mr. Walker said there was, or would be in the near future, an excellent opportunity for men in the Bureau of Fire in this city who were trained and thoroughly understood motor apparatus, and that too many men in the department were not overzealous to study this branch of the work. Due to the fact that the future would see the entire department, of necessity, equipped with motorized apparatus, the city would need the services of many men in this line. He said that the head of a modern fire-fighting department in the future would be a mechanical engineer. The chief said that Philadelphia was not slow, having used bicarbonate of soda and other chemicals in fighting fire long before New York City.

The city fire department, according to Mr. Walker, should have construction inspectors, whose duty it would be to inspect the work of constructing any motor apparatus which the city might be purchasing at the motor-car factories.

After the business session, the meeting was turned over to Dr. E. M. Bartlett, who then took the chair, and the evening's entertainment began. Mr. Hare delivered a poetical selection, which won hearty applause, after which Phillip S. Russell gave a touching selection, which was also well received. Fred G. Browning, Lee J. Eastman, F. Winsor Eveland, and several other members, participated in the evening's entertainment.

At the next meeting of the association the Entertainment Committee plans a big minstrel show, to be given entirely by the membership. The Automobile Trade Association members will be asked to attend this meeting, and, for the first time, the members of the Truck Association will invite the Philadelphia truck owners to be present.

REPORTS ON TRUCK ABUSES BY MOTOR TRUCK ASSOCIATION OF PHILADELPHIA APPRECIATED BY TRUCK OWNERS

For a short time there has been in operation in Philadelphia a system of reporting truck abuses as suggested by the Commercial Car Journal by members of the Motor Truck Association, all of whom are connected with the trade, and are supposedly capable of judging when commercial cars are being abused. These reports are turned in to the secretary on blanks prepared for the purpose and carried by the members. He in turn notifies the owner of the truck, giving the date, location and circumstances.

A letter was recently sent out by the association to some nine hundred well-known truck owners in the vicinity, asking whether they would co-operate with the association, and would care to have abuses reported. The returns up to the present time indicate that the vast majority are in favor and welcome any information as to improper handling of their vehicles while out of their sight.

The reports are unearthing many occurrences of which the owners knew nothing.

A case in point is that of a well-known furniture house, whose truck was reported as being driven very recklessly, narrowly missing a pedestrian and crashing into a touring car. It was found that the truck at the time was supposed to be in a certain repair shop, and that it was not driven by their driver, or anyone authorized to handle it. If a serious accident had occurred, they would, of course, have been held responsible. Needless to say they were glad to know the circumstances. This is only one of numerous examples which are cropping up, and the owners are uniformly thankful to know that their vehicles are at least under partial supervision, by which they can bring to time careless, indifferent, or criminally negligent drivers.

The drivers are also beginning to take notice that they can't do just as they please when on the road, and are liable to be called to account at any time for flagrant abuses of their trucks.

Denby Internal Gear Driven Rear Axle Truck on Road in Des Moines, Iowa

This truck not only negotiates the quagmine shown above, carrying 2100 lbs. in the body, but pulls behind it a six-cylinder automobile. The test was a most strenuous one for every part of the machine, and especially the engine and the Russel rear axle construction. It was the first vehicle of any kind over the road within ten days, owing to prolonged rains. The high clearance of the axle and the enclosed gears made this performance possible. The mechanism was taken down after the trip and when examined, was found to be in most excellent condition.

The CCJ has most advertisers because it gives them biggest returns

JITNEY 'BUS SITUATION IN DETROIT

Although there was much agitation in certain quarters at the outset, jitney 'buses have not, as yet, reached formidable proportions in Detroit. The only really serious effort to establish service of this nature has been made by the Wolverine 'Bus Company, which operates a seventeen-passenger enclosed car from North Grand Boulevard to Jefferson Avenue on Woodward Avenue, a distance of about 3½ miles. This 'bus was constructed especially for the work, and is modern in every respect. It has not been in operation a sufficient length of time to determine just what the outcome will be. The rest of the "flying squadron" is made up almost entirely of old cars whose owners hope to pick up enough stray nickels to make the venture profitable, but who thus far have not met with any great degree of success, owing in part, perhaps, to the fact that winter weather has made the street cars far more comfortable. Besides, there is the added handicap of seven-for-a-quarter tickets on the street cars. Jitney 'buses have operated exclusively on Woodward Avenue, which carries one-sixth the entire car traffic of the city, and considerable complaint has been made because the drivers run their cars into crowds waiting for street cars and solicit patronage, thereby, it is alleged, endangering the lives of pedestrians. Peaceful efforts on the part of the police to induce the drivers to halt 75 ft. from street intersections when letting passengers off, instead of at the crosswalk, have proved of little avail, and summary measures are being planned if the practice continues. Under a strict interpretation of the ordinances jitney 'buses of any nature or size whatever would be liable for the $10 annual fee charged for public vehicles. However, it being a new proposition, no attempt has been made to collect the license, because it is thought possible that special legislation will prove more equitable if the number of these vehicles increases.

FROM LOS ANGELES TO SAN DIEGO, CAL., IN A POP-CORN WAGON

This is the story of Wm. Bryson's experience with his Studebaker delivery car chassis fitted up as a lunch counter, pop-corn and hot tamole wagon. A special body was built on a regular Studebaker 1500-lb. delivery car chassis. When this body is opened out, it makes a complete lunch stand. No detail is lacking in its equipment. There is a stove. Two ice boxes are conveniently placed to preserve meats, milk, butter, eggs, etc. The latest kind of a pop-corn machine and peanut roaster has been installed. There is a steam cooker for hot tamoles, a case for bread, buns, pies, etc. It is equipped with electric lights and an electric drink mixer. Fresh drinking water is supplied from a 15-gal. water tank.

Customers are served from two white-enamel folding counters. Mr. Bryson is very enthusiastic over his Studebaker pop-corn wagon. He said "I follow the auto races throughout California from Los Angeles to San Diego. I make it a point to be at all large picnics and public celebrations. I have not had a minute's trouble with the car.

Studebaker Pop-Corn Wagon

In use in California in following races and fairs. It is at the Panama-Pacific fair at the present time

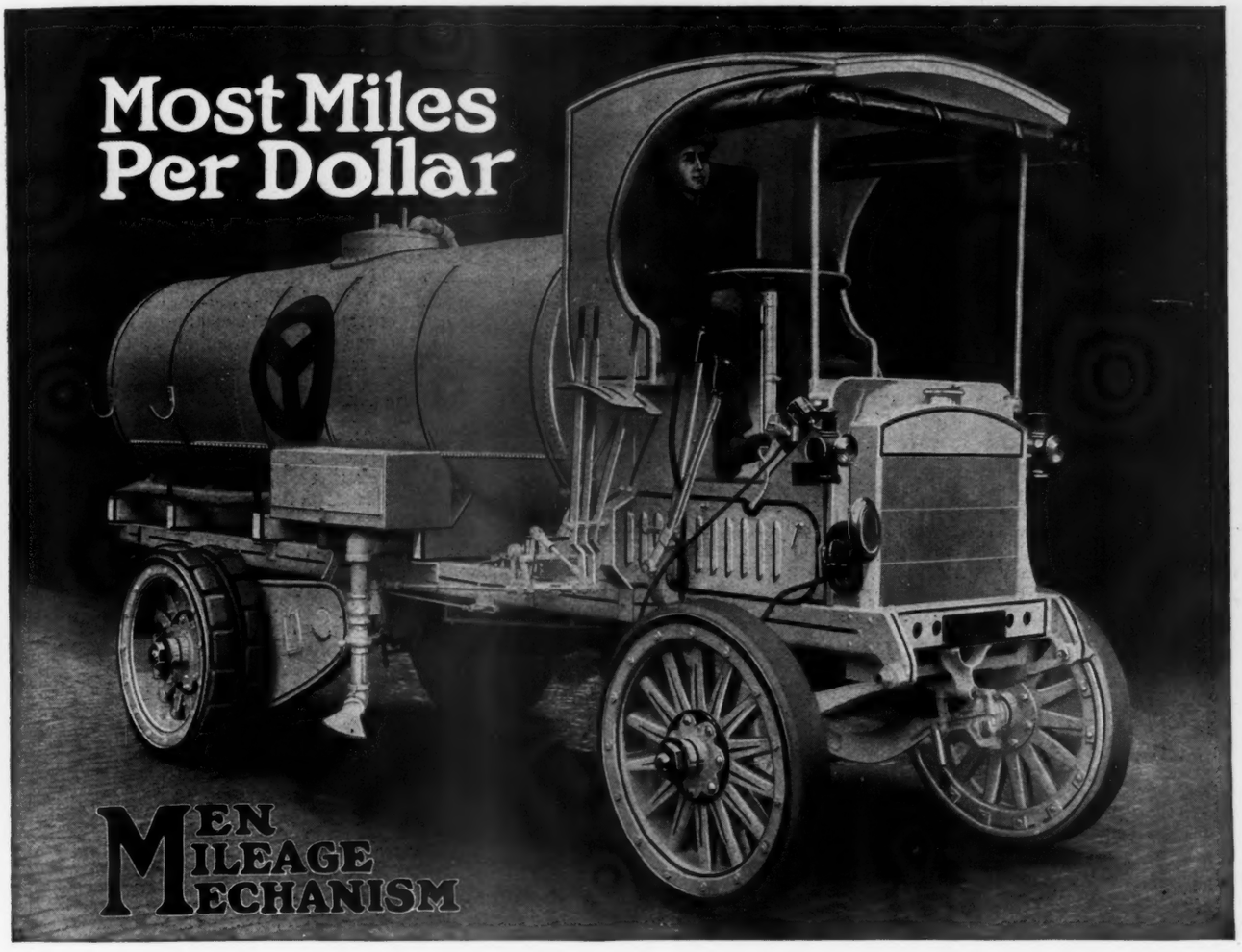
Kissel Motor Car Company has sold five 1500-lb. trucks to the Panama-Pacific Exposition. Of these, four are used in the commissary department, and the other in the financial department.

Morton Truck & Tractor Company, Harrisburg, Pa., has secured on order for ninety-four commercial trucks for the British government. Work on the order will provide employment for additional men at the plant night and day.

Automobile Trade Association Men of Philadelphia Dine

A general good time, describes the annual banquet of the Philadelphia Automobile Trade Association, held at the Hotel Adelphia, April 5th. The banquet was in part a testimonial to the good work of the Philadelphia Show Committee. Leather-covered desk clocks were presented to each of the members of the Show Committee. Some very clever addresses were made, playing upon the peculiarities and foibles of the various members. A musical and vaudeville show then entertained the members until a late hour.

The CCJ has most readers because it gives most information



YOU do more than cut down tire mileage cost when you apply Firestone Equipment to your Trucks.

You protect your drivers from the fatigue and ill-temper of needless rack and jar.

You conserve their energy. And the resiliency of Firestone Tires means more than this comfort to them. Firestone grip and traction mean easier handling, easier steering.

Truck mechanism comes in for this greater protection. Fewer lay-ups, less repair expense.

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Firestone

TRUCK TIRES

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THE JITNEY IN KANSAS CITY

The mushroom-like growth of the jitney business in Kansas City, which was an organized industry within a week after the first Ford roadster with a huge figure "5" painted on its windshield began to operate on Twelfth street last winter, was as much of a surprise to the original pioneers of the enterprise as to the Metropolitan Street Railway Company, which public service corporation the jitney was designed to overthrow as a factor in politics.

The jitney 'bus was a political expedient, conjured up by the fertile originative genius of a powerful afternoon newspaper known to the people of Kansas City as a consistent enemy of the street railway, and few thought the innovation would last long after its purpose was served. Now, however, after fully three months have past, the jitney not only has become a well-organized concern operating on a fixed schedule at prices regulated by a central board of directors, but its promoters are looking forward to a national combination of jitney drivers. A nation-wide convention of drivers of this kind of public conveyance has been called by W. H. Miller, E. K. Carnes, Secretary of the National Jitney Association, City Jitney Livery Company, to be held at Kansas City, May 4-5-6.

The object of the meeting will be to establish a closer relationship between jitney drivers throughout the country to combat unfair or adverse legislation and discuss favorable legislation, insurance, safety in operation, licensing of drivers, style of equipment best adapted to the different classes of service under varying conditions and other kindred topics.

In spite of the lack of even efficient and protective ordinances, it must be admitted by everyone who has closely observed the growth of the business since its inception, that the small privately owned car is not an unqualified success and is fast disappearing from the field in favor of the commodious and comfortable 'bus that will carry from ten to twenty-five passengers.

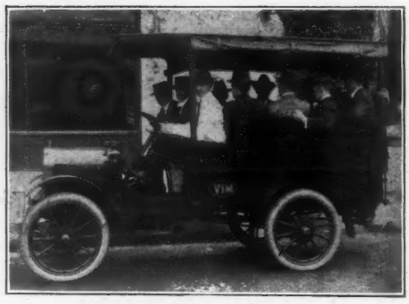
The first jitney 'bus to appear on the streets of Kansas City was owned by W. B. Webb, one of the original jitney drivers. The conveyance was crude, and brought scant delight to the hearts of women passengers, whose hats were tilted askew by the jolting of an antedeluvian motor car over the rough and poorly paved suburban streets. Mr. Webb had an auto truck which he had designed to haul pianos, and, being an amateur carpenter, he built the body himself and equipped it with plain pine benches. However, Webb was a genial soul and soon established a regular patronage. He made money when owners of smaller cars operated at a loss. And now he courses through the streets in a spanking new six-cylinder 'bus, de luxe with pneumatic tires, cushioned seats, pay-as-you-enter system and other frills.

To-day there are nearly four hundred jitneys operating in Kansas City, and fully one-fifth of the traffic is by modern 'buses built especially to suit the needs of the service. The four-cylinder Ford is still working, but the ambitious owners have taken off its cramped black body and built instead an ample red 'bus box, capable of holding ten persons. The Studebaker Company is rumored to have recently shipped forty de luxe 'buses to a newly organized transportation company and there are 'buses of all makes and designs to be seen everywhere.

One of the first interurban 'buses was started March 21, last, by D. B. Young, operating on a schedule between Independence and Lee's Summitt, Mo., charging 75 cents for the round trip. A "simoleon" 'bus also has appeared in central Missouri, the rate, considering the length of the trip, considerably reduced from regular railroad prices.

Kansas City is connected by 'bus service with Excelsior Springs, Mo., a famous watering place; Liberty, Mo.; Overland Park, Kan., and Bonner Springs, Kan.

With the advent of the 'bus has come increased profits. N. H. Helsel, a wholesale baker of Kansas City, who lost money in the operation of a small jitney roadster, purchased a ten-passenger 'bus and cleared $8 in 7 hours' work. Other 'bus owners are clearing large sums daily, and there are other evidences that the larger vehicle has come to stay.



Vim Jitney in Los Angeles

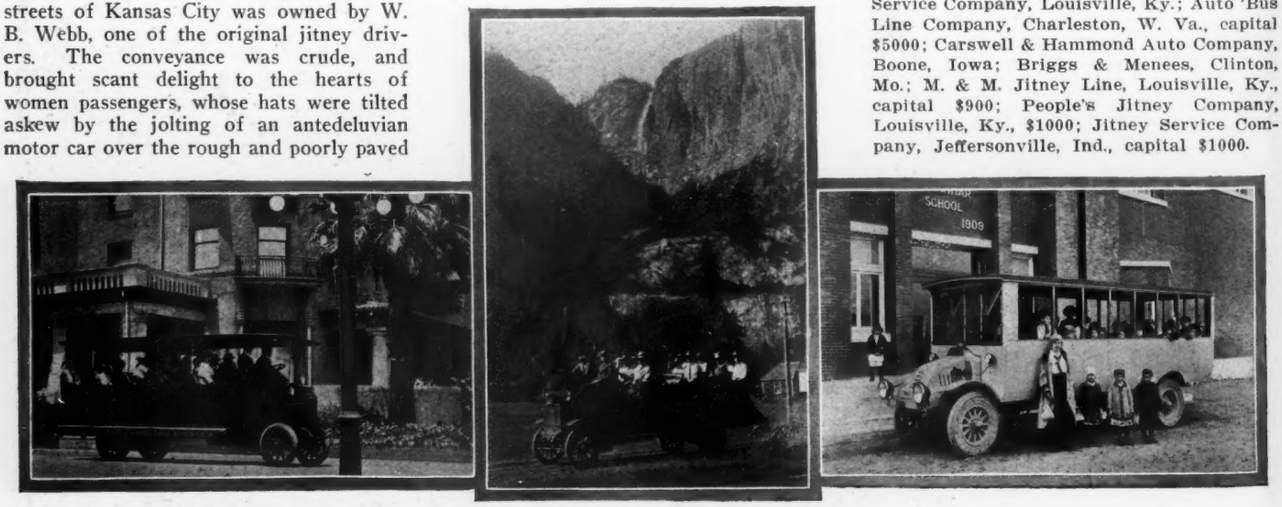
Showing a Vim with special jitney 'bus body, selling for $800. Later this type was superseded by one with side entrance, which distributor Albert L. Brush ,Los Angeles, finds more suitable for the traffic.

On Top of Mt. Rubidoux, California

'Bus carrying touring party on 140 mile trip from Los Angeles; fare $3.50 per person. Boulevards all the way.

New 'Bus Companies Recently Formed

Texas City & Galveston Auto Line, Texas City and Galveston, Texas, capital stock $1000; Jitney Auto Company, Paducah, Ky., capital $500; E. F. Neal & C. T. McKeehan, 634 Kansas Avenue, Topeka, Kans; Jitney Service Company, Providence, R. I.; Norfolk Jitney 'Bus Company; Jitney Transportation & Storage Company, Kansas City, Mo., capital $3000; Toledo Jitney Service Company, Toledo, Ohio; Union Jitney Company, Memphis, Tenn., capital $1500; Jitney Auto Transit, St. Paul, Minn.; Northwestern Rapid Transit Company, Portland, Ore., capital $1000; Elerick Jitney Auto Company, Oklahoma City, Okla., $25,000; Jitney Service Company, Louisville, Ky.; Auto 'Bus Line Company, Charleston, W. Va., capital $5000; Carswell & Hammond Auto Company, Boone, Iowa; Briggs & Menees, Clinton, Mo.; M. & M. Jitney Line, Louisville, Ky., capital $900; People's Jitney Company, Louisville, Ky., $1000; Jitney Service Company, Jeffersonville, Ind., capital $1000.



Large 'Buses Operating in Los Angeles and Vicinity

On the left is seen a Moreland twenty-passenger sightseeing 'bus. The Moreland truck in the center makes two trips a day from the railway terminal into the Yosemite Valley, throughout the summer season. The school 'bus, a Kelly-Springfield three-ton truck, is used to transport grammar-school pupils to the shool at San Fernando. It makes a pick-up trip of thirty miles every morning, getting the children to school by nine o'clock. The truck seats forty-four. No trouble is experienced in getting them off to school, as they make a picnic of the trip both ways.

The CCJ is the only truck journal a member of the Audit Bureau of Circulations—Why?

EVANSVILLE BREWING ASSN. 8 WHITE TRUCKS
THE ATLANTIC REFINING CO. 71 WHITE TRUCKS
JOSEPH HORNE CO.-30 WHITE TRUCKS
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MANDEL BROS. 17 WHITE TRUCKS
B. ALTMAN & CO. 35 WHITE TRUCKS
CITY of NEW YORK 12 WHITE TRUCKS
AMERICAN CAN CO.-8 WHITE TRUCKS
T. EATON CO. Ltd. 14 WHITE TRUCKS
SPEAR & CO. 13 WHITE TRUCKS
GREENFIELD ELECTRIC LIGHT & POWER CO. 10 WHITE TRUCKS
KAUFMANN & BAER CO. 40 WHITE TRUCKS
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THE E.T. WOODRICH CO.-18 WHITE TRUCKS
THE HIGBEE COMPANY 10 WHITE TRUCKS
ARMOUR & COMPANY 71 WHITE TRUCKS
ATLANTIC ICE & COAL CORPORATION 15 WHITE TRUCKS
STANDARD OIL CO. of NEW YORK 76 WHITE TRUCKS
THE CLEVELAND AKRON BAG CO. 19 WHITE TRUCKS
BOGGS & BUHL 28 WHITE TRUCKS
CHICAGO FIRE INSURANCE BOARD 13 WHITE TRUCKS
TELLING'S ICE CREAM
W. & J. SLOANE 13 WHITE TRUCKS
TELLING BROTHERS CO. 10 WHITE TRUCKS
GULF REFINING CO 101 WHITE TRUCKS
STANDARD OIL CO. of INDIANA 65 WHITE TRUCKS
STERN BROTHERS—18 WHITE TRUCKS
SAKS & COMPANY 10 WHITE TRUCKS
SOUTHERN EXPRESS CO. 8 WHITE TRUCKS
ASSOCIATED BELL TELEPHONE CO. 45 WHITE TRUCKS
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CITY of BOSTON—21 WHITE TRUCKS
THE BELL CO. 12 WHITE TRUCKS
N.Y. BOARD of UNDERWRITERS 14
CITY OF CLEVELAND 17 WHITE TRUCKS
KAUFMANN BROS. 24 WHITE TRUCKS
GLACIER PARK TRANSPORTATION CO. 11 WHITE TRUCKS
BUTTER-NUT BREAD
THE MAY COMPANY 11 WHITE TRUCKS
CITY OF PITTSBURGH 15 WHITE TRUCKS
THE HUB 10 WHITE TRUCKS
SCHULZE BAKING CO. 12 WHITE TRUCKS
LOS ANGELES BREWING CO. 13 WHITE TRUCKS
10 WHITE TRUCKS
SUPREME BAKING CO. 18 WHITE TRUCKS
UNITED STATES POST OFFICE DEPT. 28 WHITE TRUCKS
OPPENHEIM COLLINS & CO. WHITE TRUCKS
THE ROSENBAUM CO. 35 WHITE TRUCKS
O.O. SUMMERS CLEANING CO.

BUILT IN truck service as rendered by The White Company proves *character of construction* and insures *maximum hauling.*

Pre-purchase **service given by White analysts enables the buyer to avoid mistakes in selecting the truck for his particular needs.**

Such service advantages—at the time a choice is made and thereafter in the highest measure of efficiency—are far beyond any service which means only quick repairs. The number and size of White fleets is your guaranty that such service is *delivered* — according to promise. The growth of White fleets is evidence of of satisfaction—for only the satisfied man buys the same thing again and again.

You are invited to submit your transportation problems to us. We can help you.

Exhibiting at the Transportation Building, Panama-Pacific International Exposition, San Francisco

THE WHITE COMPANY
CLEVELAND

LARGEST MANUFACTURERS OF COMMERCIAL MOTOR VEHICLES IN AMERICA

New York	Broadway at Sixty-Second Street	Pittsburgh	Craig Street and Baum Boulevard	Seattle	1514 Third Avenue
Chicago	2635-2645 Wabash Avenue	Atlanta	63-65 Ivy Street	Memphis	278-280 Monroe Avenue
Philadelphia	216-220 North Broad Street	St. Louis	3422 Lindell Boulevard	Dallas	2025-2027 Commerce Street
Boston	930 Commonwealth Avenue	Washington	1233 20th Street, N. W.	Toronto	14 Alexander Street
San Francisco	Market St. and Van Ness Avenue	New Orleans	750 St. Charles Avenue	Montreal	Forum Building
Baltimore	Mount Royal and Guilford Avenues	Newark	33-35 William Street	Winnipeg	230 Fort Street

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Motor Dump Trucks Gaining Rapidly in Favor With Chicago's Teaming Interests

Those Engaged in Hauling Builders' and Contractors' Supplies Use Fleets of Dump-Body Trucks. An Opportunity to Sell Coal Motor Dump Trucks

By WALTER A. BERMINGHAM

THERE are already many fleets of dump motor trucks now in commission among those engaged in hauling builders' and contractors' supplies, but the coal trade is not making the use it should of dumping body trucks.

The wintry street conditions in Chicago have been, during the passing season, execrable, owing to weeks' of ice or slippery snow covering over smooth pavements, causing numerous accidents to horse equipment and with a heavy horse mortality as well as expensive loss of time in making deliveries.

Old Teaming Company Now Uses Trucks

The Timroth Teaming Company, Incorporated, has in its fleet three six-ton Peerless motor dump trucks. One of these trucks covered 25,000 miles before needing overhauling. Its service record is now twenty-two months and it was the first Peerless equipped with a dump body to be placed in commission in Chicago. This teaming corporation is also using in its service six Garford dump motor trucks, six-ton capacity each, equipped with Jacob Press Sons' dump equipment.

Economy of Gasoline Against Horseflesh

Charles E. Timroth, vice-president and manager, gave as his reason for using motor dump trucks: "While by far the horse is still largely predominant in our business, I cannot say too much in favor of the use of power to replace them for our purposes. I have for our three Peerless motor dump trucks data almost unbelievable, proving the economy of gasoline against horseflesh. I have had two years' experience with motor dump trucks, employing careful drivers, working day in and out, regardless of weather or pavement conditions, and so thoroughly have I become convinced of their practicability, utility and economy that I am going to increase our fleet to fifteen motor dump trucks. In hauling crushed stone from chutes I find that one motor dump truck will do the work of four two-horse teams, and the same applies to asphalt hauling. For coal I cannot make as good a comparison, as much time is lost in weighing, delivering, etc., but they will do better than two three-horse teams. I figure approximate cost of mileage at 40 cents."

The Timroth trucks are in daily service for the R. F. Conway Paving Company, the Artesian Stone and Lime Works Company, the Franklin Coal Company and several other concerns. The Timroth Company have been twenty-one years in the teaming business.

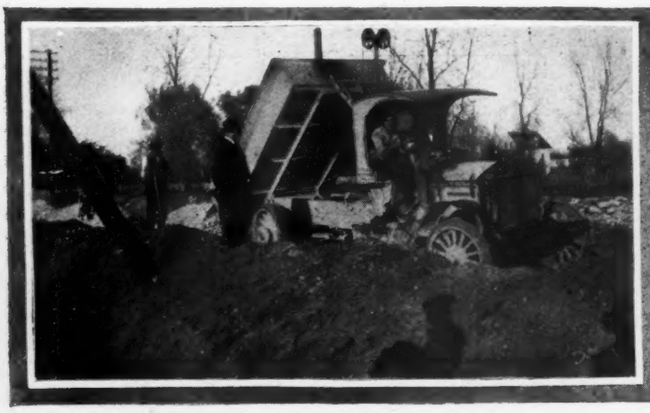
The motor dump car fleet of the Artesian Stone and Lime Works Company, Grand Avenue and Campbell Street, Chicago, consists of five seven and a half-ton Mack dump motor trucks. They are used for full loads of lime and long hauls. Their fleet is mainly, with the present type of bodies, used for hauling rock.

Locomobile Six and a Half Ton Dump Truck Fitted With Wood Hydraulic Hoist

Cost of operation figures are given in the text

A Month's Record

With the understanding that their name will not be used, one of the largest Chicago lime works has given maintenance and efficiency figures from their records for service of two Locomobile six and a half-ton dump trucks in use one year and two Saurer six and a half-ton dump trucks in



Wide-Bodied Pierce-Arrow Dump Truck

This shows a wide-body five-ton dump truck spreading broken rock on Western Avenue, the longest street in Chicago

Five-Ton Peerless Used by Timroth Teaming Company

This dump-body truck forms one of the fleet of the C. E. Timroth Teaming Company, who do hauling for a large number of contractors

The CCJ has most advertisers because it gives them biggest returns

use two years. The figures following are for August, 1914, for one truck of each type:

Locomobile—198 trips, mileage 1463, average load carried 14,900 lbs., or 1183 cu. yds. of stone, miles run per gallon of gasoline 3.31, miles per gallon of lubricating oil 91.50.

Saurer—216 trips, mileage 1500, average load carried 14,700 lbs., or 1268 cu. yds. of stone, miles run per gallon of gasoline 3.96, miles per gallon lubricating oil 63.50.

Both Locomobiles are equipped with Budd dump bodies and one with Wood hoist. The Saurers have Wood bodies and hoists. They are still using horses for lime haulage, but are figuring on motor trucks.

The Department of Public Works of Chicago operate one White two-ton dump motor truck and two five-ton dump Pierce-Arrow. The former is used as an errand truck, and the other two for hauling stone and sand. The traffic congestion in Chicago's loop seriously interferes with economical operation for any class or type of vehicles, as it is a district one mile square in area. The Bureau of Streets of this department were repaving Dearborn Street for several blocks during business hours, one of the busiest streets in Chicago and about the busiest spot in the loop district, and yet with that handicap and a haul of 5 miles this fleet of three dump motor trucks was sufficient to keep construction material supplies ready for use for the workmen and assisted materially in the rapid completion of the work.

Six and a Half Ton Saurer Dump Truck
This car is fitted with a wide body and hydraulic hoist, and is used by the Chicago Union Lime Works

The year 1915 should be a prosperous one for manufacturers of dump motor trucks, as there is not an owner of one or more of them in Chicago who is not alive to their many advanced features for traffic, and the field is virtually a virgin one for the many who need them and are as yet lacking education as to their utility.

The McGraw Tire & Rubber Company, of East Palestine, Ohio, has opened a branch store at 737 Main Street, Buffalo, N. Y., for the sale of pneumatic tires, inner-tubes and solid truck tires.

Jiffy Jack Company, Cleveland, Ohio, has notified the trade that John F. Engle is no longer connected with that company and is not authorized to represent or obligate it in any way whatsoever.

NEW 'BUS LINE FOR BUFFALO

The jitney 'bus wave struck Buffalo February 26th when the Buffalo Jitney 'Bus Company was incorporated by Robert E. Rayman, Oscar S. Knisely and Ella M. Ryan, capitalized at $10,000, to carry on a nickel cab service within a radius of 3 miles. Since the incorporation ten 'buses have been put in operation.

Since the incorporation of this jitney 'bus line in Buffalo, the legal lights have unearthed a clause which provides that no auto 'bus line can operate without a franchise, and are under the jurisdiction of the public service commissioners. What effect this will have on the new 'bus line has not yet been determined.

"PAY AS YOU ENTER" 'BUS—18 TO 20 PASSENGERS

EQUIPPED WITH TWO DOME ELECTRIC LIGHTS—AND ELECTRIC CALL BUTTONS
SEATS RUNNING LENGTHWISE OF BODY—DROP SASH—DOOR AND STEP OPERATED BY DRIVER
SPACE FOR ADVERTISING CARDS ABOVE WINDOWS

THE MULHOLLAND COMPANY, Dunkirk, N. Y.

When Writing, Please Say—"Saw Your Ad. in the C C J"

Monkey-Wrench Adjustment

Of what use is it to make a bearing accurate to the 1-5000 part of an inch, and then allow it to be adjusted in a garage or repair shop by means of an ordinary monkey wrench?

The fine accuracy of Bower Roller Bearings cannot be thus impaired. They are adjusted radially at the factory once for all. Because of the length of the roller and its large diameter, the wear is infinitesimal. Consequently, the bearing preserves its initial accuracy indefinitely.

Bower Roller Bearing Company

DETROIT, MICH.

New ½ Ton Fast Delivery Car

FOR

Department Stores, Florists, Banks, Jewelers, Tobacconists, Druggists, Grocers, Butchers,

and other retail dealers where a fast, good-looking, light, moderately-priced delivery car is wanted.

The First Real Light Delivery Car With Worm Drive
BUILT LIKE A TRUCK FOR ECONOMICAL SERVICE

After more than a year of careful design and study of requirements, our engineers have now produced a light delivery car, every unit of which is made to harmonize with every other unit to give speed, appearance, durability, and economical service that surpasses anything ever placed on the market for light work. Our combination of high-grade units has been successful—so successful in other models of Lippard-Stewarts because of the Lippard-Stewart standard of construction, and our many years of experience in working out the proper combination of material, like Timken Roller Bearings and Axles, spring suspension that does away with torque and radius rods, steel frame of high-carbon steel where others use lower grades, and a proper proportion between power plant, transmission and worm drive.

Saves the Upkeep Cost of Reconstructed Pleasure Cars

The ½ ton Lippard-Stewart has a regular truck type of steel frame, spring suspension and heavy rear axle. A reconstructed pleasure car has frame, suspension and rear axle construction never designed to stand delivery car service. With the ½ ton Lippard-Stewart in the field, you can no longer afford the upkeep expense of reconstructed pleasure car service.

Saves Waste Power and Waste Capacity of Larger Trucks

The majority of delivery cars and trucks used in the lines of business mentioned above rarely operate to capacity in average truck service. There is as much waste in operating too big a car as there is in overloading. The ½ ton Lippard-Stewart will save you initial expense and save more in operating expense.

Electric Starting and Lighting

There is more need of an electric starting and lighting system on light commercial cars than there is on pleasure cars, as more frequent stops and starts are made. This is the first ½ ton delivery car furnishing an electric starting and lighting system as regular equipment.

A Lippard-Stewart fleet, made up of different capacities, will save money for every delivery car and truck operator.

Business Men, Write Us about your delivery problems. Let us tell you of our years of leadership and economical service for big operators throughout the country, as well as for small retail operators.

Catalog and Special Truck Information Sent on Request.

Radiator at Dash Our Dealers' Sign

Lippard-Stewart MOTOR TRUCKS

½ Ton, ¾ Ton, 1 Ton, 1½ Ton, 2 Ton

Active, hustling dealers, write for our proposition that cannot be equalled. Our ½ ton model opens up a field that before has not been touched. Our line of capacities is what every good dealer needs.

Study These Specifications Carefully

Proper combination of these units is what makes Lippard-Stewart quality. Others may copy units—they can never copy Lippard-Stewart standards.

Motor: Special truck motor made in size and power to combine with transmission and worm drive. Long stroke, low speed, 3¼" bore x 5" stroke. Cylinders, L-head, cast en bloc. 25 horse power.

Ignition: Atwater Kent, automatic Unisparker, automatically controlling spark at varying speeds of motor.

Carburetor: 1 inch.

Transmissions: Selective type—three speeds forward and reverse. Heat-treated nickel-steel gears. Center control.

Clutch: Cone type, leather surface with adjustable springs.

Front Axle: Timken "I" beam, with wheels mounted on Timken Roller Bearings.

Rear Axle: Heavy Timken, with Timken-David Brown Worm Drive. (We are first—worm drive leaders again.)

Bearings: Timken Roller Bearings throughout.

Wheels: Artillery type.

Tires: Extra large, 33" x 4" front and rear—Firestone Standard; type, pneumatic.

Steering Gear: Worm and Nut; capacity, 1500 lbs.; location, left side with control in center.

Brakes: Double-acting on rear wheels; extra large size emergency and service, internal expanding, duplex type; both encased in single brake drum of the open type; quick-acting.

Springs: High-carbon steel of special quality for truck service; semi-elliptic, front and rear; front, 38" long x 1¾"; rear, 50" long x 2" wide; suspension springs in truck design as opposed to ordinary pleasure car design.

Frame: Channel section, pressed steel for delivery car or truck, as opposed to pleasure car type.

Wheelbase: 106".

Radiator: Back of hood—the Lippard-Stewart place for safety and efficiency.

Gasoline Tank: Capacity, 10 gallons.

Starting and Lighting System: Single unit system, including 12-volt battery; front electric headlights with dimmers; electric tail light; electric horn.

Fenders: Crown-shaped; finish, black enamel.

Lippard-Stewart Motor Car Company

237 West Utica Street Buffalo, N. Y.

Pomona, Cal., March 14, 1915

Signal Motor Truck Company
Detroit, Mich.

Dear Sirs:

It has been some time since I wrote you about my first truck I bought of Hawley, King & Co. I put in the passenger 'bus line between Los Angeles and Pomona. No. 1 'bus has now done 23,000 miles and just overhauled the motor, which is in good shape. Front tires are still on the car; rear tires gave 14,000 miles of service. I now have three SIGNALS and will soon want another one. I have three new twenty-passenger bodies on these trucks and if the two last cars give me as good service as the first one, I shall be more than satisfied. No. 2 has gone 12,000 miles; No. 3, 5,000 miles, and all running in fine shape.

Respectfully

T. CLARK

THE SIGNAL 'BUS LINE

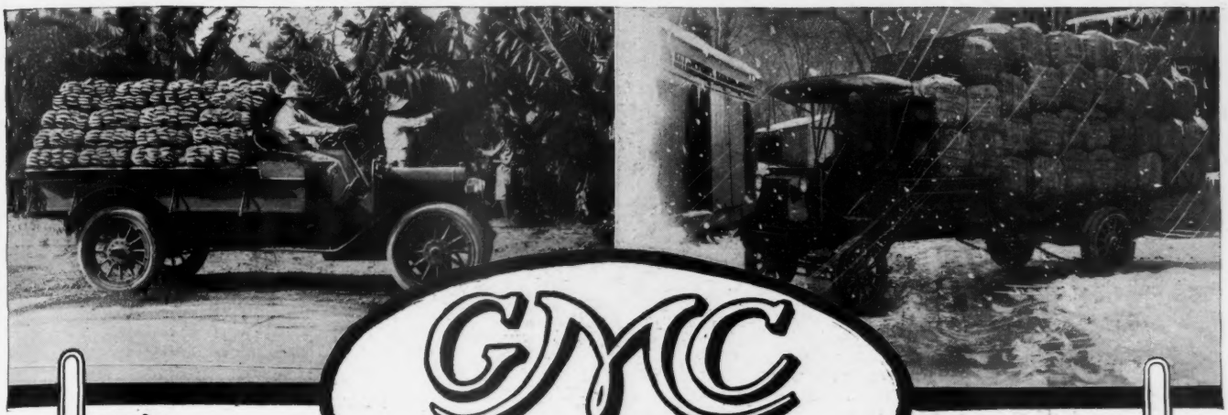
WORM DRIVE NOISELESS AND EFFICIENT

THE ABOVE UNSOLICITED TESTIMONIAL SPEAKS FOR THE SIGNAL IN 'BUS SERVICE

1	*ton*	*12*	*passenger 'bus*	*(chassis only)*,		*$1500.00*
1½	*"*	*18*	*"*	*"*	*"*	*1750.00*
2	*"*	*24*	*"*	*"*	*"*	*2000.00*
3½	*"*	*36*	*"*	*"*	*"*	*3000.00*

All kinds of bodies furnished from $600.00 to $1500.00. Electric lighting, starting and heating if desired

Signal Motor Truck Co., Detroit, Michigan, U.S.A.



GMC

GENERAL MOTORS COMPANY

TRUCKS

Gasoline Electric

100°F ZERO

100°F ZERO

From 100 in the shade to 10 below zero

Handling five-ton loads on snowy highways to displacing ox-carts in the tropics is a big step. But it shows the broad utility of GMC Motor Trucks. It indicates how they can be made to fit the service under widely varying requirements and working conditions.

And GMC Trucks "fit the service" because they are built with an understanding of the work they will be called upon to do. We make gasoline trucks from 1500 pounds to five tons in capacity and electrics from 1000 pounds to six tons. We build both worm and chain-drive models. Each one of these trucks excels in some particular kind of work.

As pioneer builders of motor trucks and manufacturers of the only complete line of both gasoline and electric trucks in the world, we are able to tell you and sell you the type of truck best suited to *your* particular class of service. And the co-operation of our practical transportation men is available to you without cost.

"A Truck To Fit Your Business"

GENERAL MOTORS TRUCK COMPANY

One of the Units of General Motors Co.

Pontiac Michigan

Direct Factory Branches:

New York Detroit Boston Chicago Philadelphia St. Louis Kansas City San Francisco

G. A. Wood—Inventor of the original Wood Hydraulic Hoist, demonstrating his improved and latest invention—the **hoist** with the **large, tubular piston.**

Protected by Patent Law

WOOD Hydraulic Hoist and Bodies

are used by leading truck makers as standard equipment on all dumping outfits.

The illustration shows the latest Improved Wood Hydraulic Hoist and Standard Sand and Gravel Steel Dump Body, as applied to a truck chassis.

You will note at once the clean-cut and integral appearance of the outfit, and the extremely large lifting member or Piston Rod (the Vital Factor) with which it is equipped.

The Wood Hydraulic Hoist and Body Solves the Dumping Problem

Its simplicity, adaptability and efficiency appeal to everyone. *Write for illustrated literature*

"Made in Detroit"

Wood Hydraulic Hoist and Body Company

560 Franklin Street ∴ Detroit, Mich.

Successor to Wood Hydraulic Hoist Co., St. Paul, Minn.

A Brake is no Better than its Lining

It's the lining that does the actual work. If it is not efficient the brake mechanism can't be. Don't entrust the safety of your truck to an inferior brake lining. See to it personally that the brakes are lined with

J-M NON-BURN BRAKE LINING

For this brake lining can be relied upon to bring the heaviest vehicle to a complete stop in the shortest time when emergency demands. It possesses gripping power far in excess of ordinary needs. And its economy is no less pronounced.

For sale by all good Dealers. Every strip of the genuine is stamped "J-M Non-Burn."

Interesting booklet sent on request

Soot Cannot Affect Its Sparking Power

Soot puts a poorly constructed plug out of business in short order, but it can't damage a

J-M (Mezger) Soot-Proof SPARK PLUG

J-M (Mezger) Soot-Proof construction keeps the plug clean at the sparking point, prevents fouling, prevents short-circuiting, prevents an enfeebled spark and hence insures ignition efficiency.

Ask for this plug at your dealer's. Look for the letters "J-M" on the porcelain. Sizes for all motors. Price, 75 cents each.

Send for booklet

3065

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Akron, Albany, Atlanta, Baltimore, Birmingham, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Columbus, Dallas, Dayton, Denver, Detroit, Duluth, Galveston, Houghton, Houston, Indianapolis, Kansas City, Los Angeles, Louisville, Memphis, Milwaukee, Minneapolis, Newark, N. J., New Orleans, New York, Omaha, Philadelphia, Pittsburgh, Portland, Ore., Rochester, St. Louis, St. Paul, Salt Lake City, San Francisco, Seattle, Syracuse, Toledo, Washington, Wilkes-Barre, Youngstown

THE CANADIAN H. W. JOHNS-MANVILLE CO., LIMITED Toronto Montreal Winnipeg Vancouver

For the quarter century just passing we have held the dominating position in the vehicle industry—particularly the last fifteen years, during which time we have specialized on the development and production of springs of all types and sizes for the various kinds of motor-driven vehicles

In all this time we have never been able to discover any actual practical merit in features.

As time goes on, the more firmly we are convinced that the relative value of anything other than scientific design—exact selection of materials—skill in heat treating—absolute integrity in applying the lessons learned from break-down tests is nil.

In arriving at this conclusion we are not alone, for the experience of the world's foremost automobile engineers has substantiated it.

The above illustration shows a section of one of our heat-treating departments where one of the most important stages in the manufacture of Sheldon Springs takes place.

SPRINGS

In this department the equipment is more complete and up to date, practice is more exact, and the skill and experience of the operatives—from engineers down—more comprehensive than can be found anywhere else in the world.

THE SHELDON AXLE AND SPRING COMPANY

MAKERS OF SPRINGS AND AXLES FOR HEAVY DUTY SERVICE FOR MORE THAN 50 YEARS

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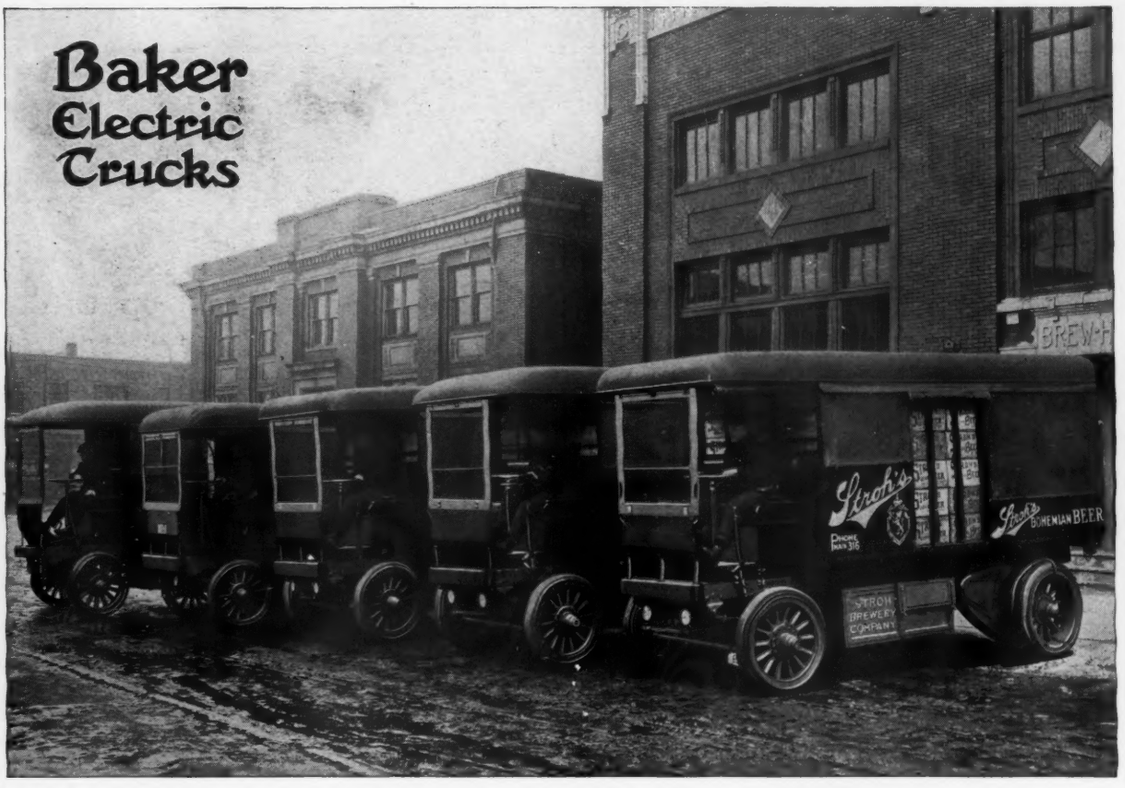
When Writing, Please Say—"Saw Your Ad. in the C C J"



Baker Electric Trucks

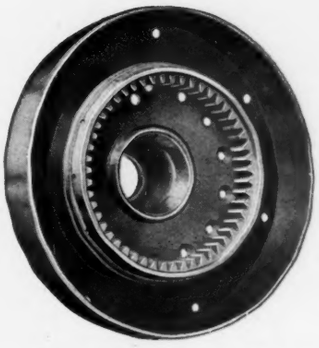
are in service in 98 distinct lines of trade in as many different cities located in the United States, Canada, Alaska, England, France, Porto Rico, South America, South Africa, Siam, Japan and Australia. Our Truck catalog shows many of these trucks and gives interesting figures on what they have actually done. May we send it to you?

Capacities: one to five tons.

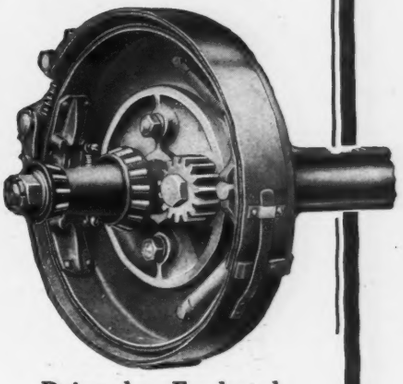
Body designs to meet any requirement.

The Baker Motor Vehicle Co., Cleveland

TORBENSEN INTERNAL GEAR DRIVE AXLES



Internal Gear in
Dust-Proof Housing



Drive by Enclosed
Efficient Spur Gear

This is an age of specialization, and this axle is a specialized product. It supplies as a unit two distinct parts, each of which is a specialist.

One does nothing but transmit the torque.

The other, a solid I-beam axle of ample strength, carries all the load.

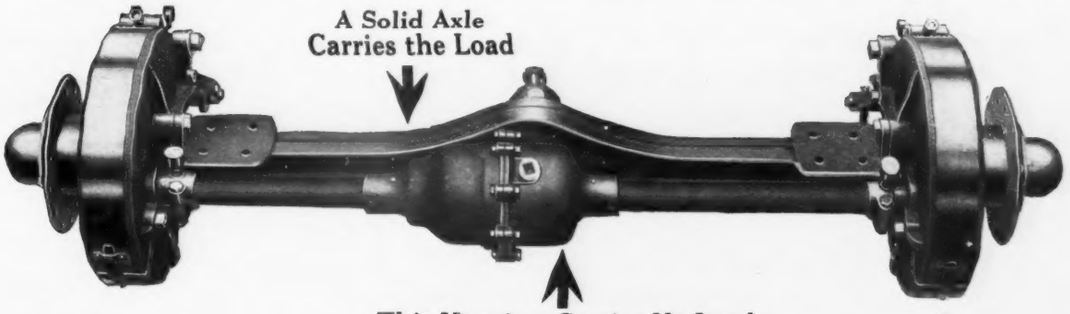
This is the most efficient combination known for use in trucks, a spur pinion and internal gear forming the drive. Its superiority to other types is so marked that the percentage of trucks using it is increasing rapidly.

All Moving Parts Enclosed

Torbensen Internal Gear Drive Advantages:

Silent always	Final and main gear reduction in wheels themselves
Long life	Separate member for each duty
Great efficiency	Lighter than other forms for same work
No exposed parts	Maintenance and operating cost low

Write us for full particulars as to how this can be applied to your car



Torbensen Gear & Axle Company
216 to 228 High Street Newark, N. J.

Because of ABSOLUTE standardization—

One truck now demonstrates a 4-truck line

2 ton Worm Drive Truck - - - -	$2050
3½ ton Worm Drive Truck - - -	2900
3 ton Chain Drive Truck - - - -	2750
5 ton Chain Drive Truck - - - -	3400

United Motor Trucks—the line everyone is talking about right now—are built with the dealer's interests constantly in mind. The needs of the ultimate user naturally govern the construction, but since there can be no permanent satisfaction on the user's part unless the dealer's relations with the factory are right, we have taken care to see that the United line offers the dealer every inducement possessed by **any** truck, plus a number of innovations that make the United line unique.

The United Line

The above listed line comprises just the sizes and just the styles at just the prices dealers can handle best today. Choose any one of the four as a demonstrator, and you are ready for the truck buyer, whether he wants a two, three, three and one-half or five ton truck. All United Trucks are alike. Weight of material is the only variant. With both the chain and worm styles of drive, the dealer has a line that will meet the requirements of nine out of ten prospects.

We have built service, not theories, into United Trucks. There is not an ounce of the experimental, nor an ounce of the obsolete in this line.

Never was another truck built in just the manner of the United. Calling in eight great engineers, representatives of the leading institutions building component truck parts, we simply said, "Furnish your part of the **ideal truck of today.** Price is not a consideration. Standardization—built-in service—absolute superiority—those are your only limits. Go to it!"

The United Line is the answer.

Read the brief specifications—note the makers whose guarantee is joined with ours in every truck we build, then if you are interested to know more about this company—its past, present and future—write or wire just as hundreds of dealers have done since our announcement thirty days ago, and we will take pleasure in calling upon you at once.

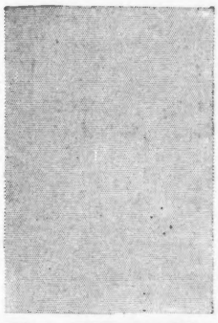
UNITED FACTORS

Continental Motor
Eisemann Magneto
Stromberg Carburetor
Mayo Radiator
Brown-Lipe Transmission
Spicer Drive Shaft
Structural Steel Frame
Perfection Springs
Timken Axles
Timken Bearings
Gemmer Steering Gear
Yale-locked Speed Governor

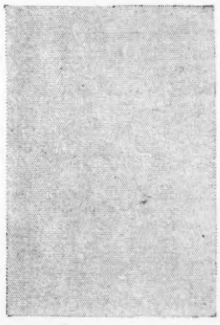
UNITED MOTOR TRUCK CO. Grand Rapids Michigan

COVERT

TRANSMISSIONS

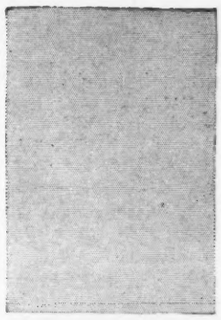


FACTORY
LOCKPORT
N.Y.

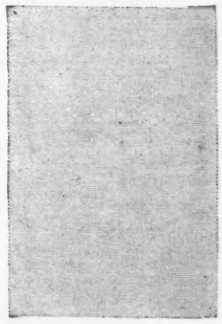


The name Covert stands for quality. It means an efficiency in power transmission that is unsurpassed. It is the recognized standard in its field. Its superiority is shown by predominance in cars and trucks that are noted for their quality.

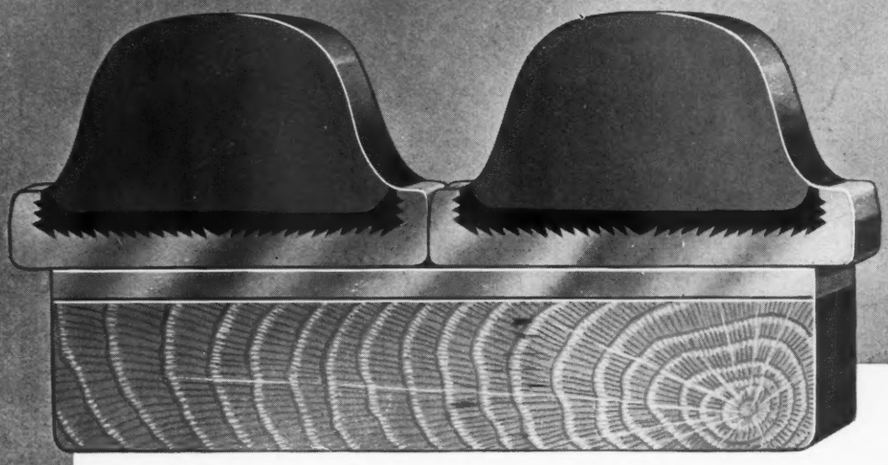
If you are striving to build cars that shall give the utmost in service, you cannot do better than to incorporate COVERT TRANSMISSIONS in them. It will be profitable for you to consult our engineers regarding the adoption of COVERT TRANSMISSIONS for your cars or trucks.



SALES OFFICE
DETROIT
MICH.



COVERT MOTOR VEHICLE CO.



NOTE THE NEW MODEL OF

GIBNEY

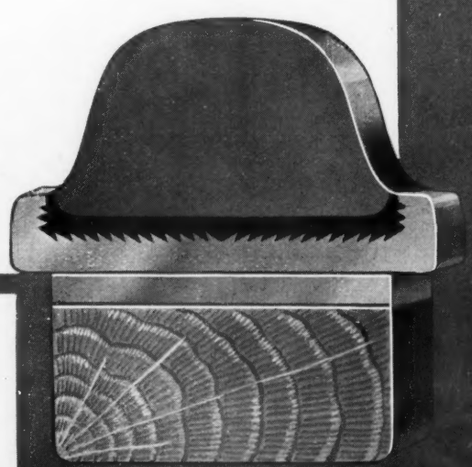
PRESSED-ON

WIRELESS TIRES

These are now made without the intermediate steel band, in both single and dual styles. The weight has been reduced without sacrificing strength, which now makes this the simplest as well as the most enduring tire manufactured in America.

Our factory is running day and night, and as we manufacture but one product — solid rubber tires—it is proof that universal recognition has been won as a result of merit.

GIBNEY TIRES are popular everywhere because they represent maximum mileage and minimum trouble.



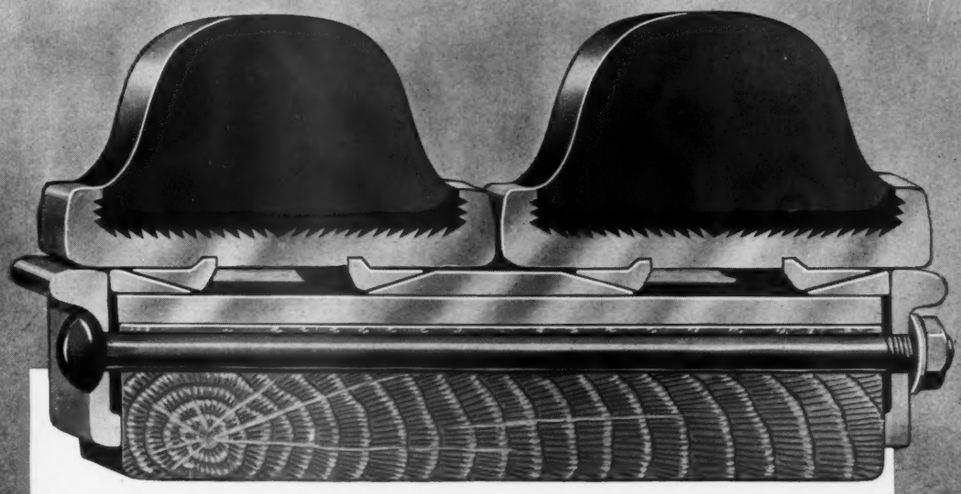
GIBNEY TIRE & RUBBER CO.

Factory, Conshocken, Pa.

BRANCHES

New York, Philadelphia, Boston, Detroit, Chicago, Newark

AGENCIES—Washington, Baltimore, St. Louis, Kansas City, Minneapolis, Milwaukee, Cincinnati, Harrisburg, Norfolk, St. Paul, Duluth, Worcester, Elizabeth, Paterson.



GIBNEY

DEMOUNTABLE

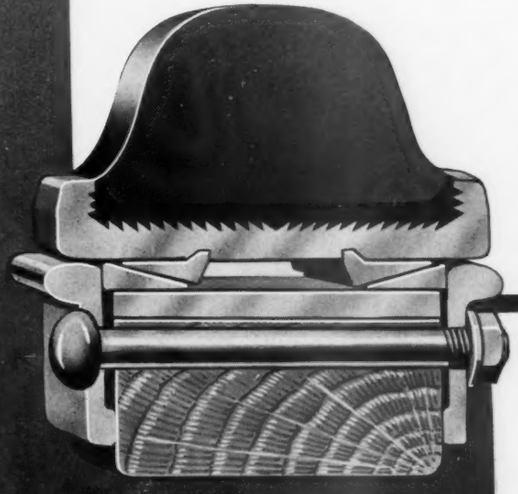
WIRELESS TIRES

offer dealers everywhere an opportunity to go into the solid tire business without investing a large capital for special equipment. Nearly all demountable tires are interchangeable and GIBNEY TIRES are now being used on wheels which have heretofore carried other makes.

We have the most attractive proposition in the tire business to offer agents, and correspondence is solicited.

It is needless for us to emphasize the fact that the quality of the GIBNEY TIRE is unexcelled. Our product has been tested by consumers everywhere. As a result of comparisons, the demand for GIBNEY TIRES compels us to keep our factory running day and night.

If you are equipped to represent us right in your territory, you can share in our prosperity.



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AGENCIES—Washington, Baltimore, St. Louis, Kansas City, Minneapolis, Milwaukee, Cincinnati, Harrisburg, Norfolk, St. Paul, Duluth, Worcester, Elizabeth, Paterson.

"AMERICA'S QUALITY BEARING"

FAFNIR BALL BEARINGS

MADE IN AMERICA
SOLD DIRECT FROM FACTORY
DELIVERIES ASSURED

WHY BUY ABROAD?

ABSOLUTE INTERCHANGEABILITY
MORE SILENT THAN THE "MOST SILENT"
CLOSEST POSSIBLE LIMITS MAINTAINED AND GUARANTEED

SUBMIT YOUR ENGINEERING PROBLEMS. WE ARE IN POSITION TO WORK THEM OUT TO YOUR ENTIRE SATISFACTION. NEW CATALOG READY FOR MAILING

THE FAFNIR BEARING COMPANY, NEW BRITAIN, CONN.

EXPERIENCED MOTORISTS KNOW THE VALUE OF GASOLINE PROTECTION

—know that in order to get full value from every drop of fuel purchased, and to eliminate the danger of fire or explosion, they must carry their gasoline in a tank that "keeps it where it belongs." Exactly such a receptacle is the

"JASCO TANK"

"JASCO" SAFETY FIRST TANKS

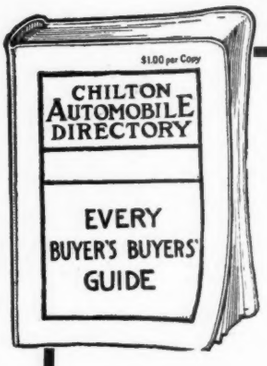
These tanks are made of superior quality drawn steel. They are without seams—which in the ordinary tank sooner or later spread, causing dangerous leaks. Each one of them is thoroughly tested before leaving our factory, and positively **cannot leak under the most strenuous service.**

They protect pocketbook, property and life.

Made in all styles and sizes to fit any standard car.

If you are not already familiar with the "Jasco Tank," write at once for free booklet and detailed information.

JANNEY, STEINMETZ & CO.
MAIN OFFICE: PHILADELPHIA
NEW YORK OFFICE: HUDSON TERMINAL BUILDING



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It is the place to go when you want definite, positive, accurate information, that will assist you in buying. Every time you use the

CHILTON AUTOMOBILE DIRECTORY

you save your time as well as learn what you wish to know. The big buyers of the Industry all use the Chilton Automobile Directory, because they have found it an invaluable aid in buying.

The Directory Has a Flexible Binding
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Send your order today to the
Chilton Company Market and 49th Sts. PHILADELPHIA, PA.

LONG COOLING SYSTEMS

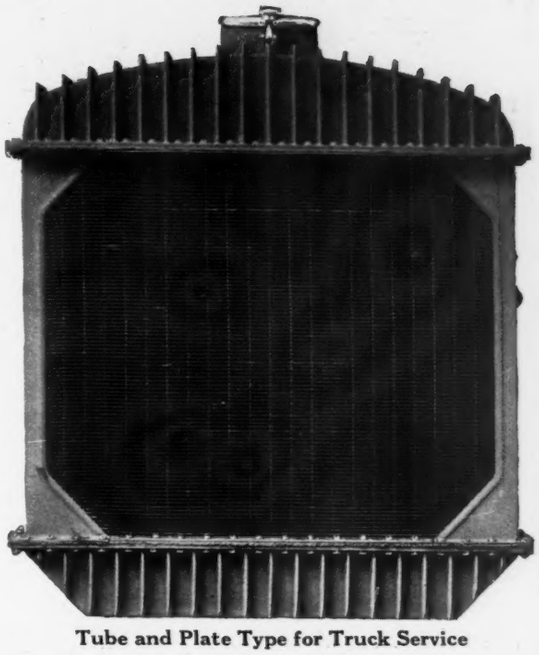
CO-OPERATION with the engineering department of the best manufacturers of motor trucks and tractors has enabled us to develop and perfect many improvements which make our product the highest quality on the market and within a price that is more than consistent with same.

With our large, modern, fully-equipped plant and efficient organization we can guarantee production sufficient to meet the demands of the largest manufacturers and in accordance with our agreements.

Several types of Long Cooling Systems are made—Cellular, Flat Tube, Honeycomb, Spiral Tube, Fin and Tube

Write for catalog. Or—if you wish, we will gladly send our representative to confer with you relative to your radiation problem.

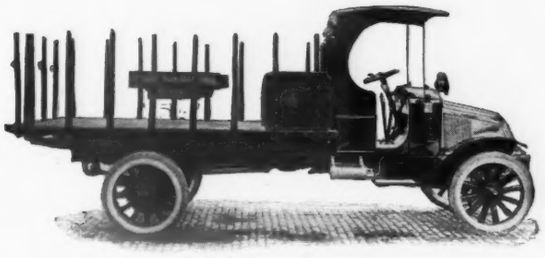
LONG MFG. COMPANY
DETROIT MICHIGAN



Tube and Plate Type for Truck Service

KREBS TRUCKS

Timken-David Brown Worm Drive



Krebs Automatic Governor

Model H, 2-Ton Truck

These features alone make the truck sell regardless of the many other high-class units and features which make the **Krebs** the most desirable and economical truck for a business man to buy.

The Timken-David Brown Worm Drive is the most efficient drive ever devised for a motor truck, and is noted for its silence, economy and long life.

The **Krebs** Governor automatically controls the motor so as to maintain the desired speed regardless of changing road conditions, and enables the driver to get the necessary power without waste of gas. It provides a sensitive control, better even than an expert's, and leaves the driver with nothing to do but steer.

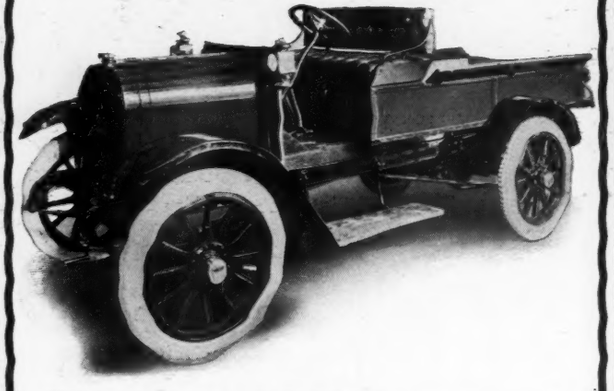
The **Krebs** ranks with the leaders in the truck field and offers advantages not found in any other make. Four models meet nearly every requirement and constitute a line that is very profitable for a dealer to handle. Model I has 3 tons capacity, Model H 2 tons, Model G 1 ton, and Model F ¾ ton. Write for detailed information about them and our sales plan.

THE KREBS COMMERCIAL CAR CO., Clyde, Ohio

DEALERS!

Here is a live proposition that will be a big money-maker for any enterprising dealer.

HOWARD LIGHT DELIVERY CAR



The Howard is a shaft-driven car on pneumatic tires, designed especially to meet the increasing demand for a high-class, low-priced car, where the loads are not in excess of 1500 pounds. It is built of standard units whose names are an assurance of quality. These include Continental Motor, 3½ x 5; Eisemann Magneto; Long Radiator; Covert Transmission; Salisbury Axles; Ross Steering Gear, and Parish & Bingham Steel Frame. The wheelbase is 107", and loading space 78"x42". Everything is high grade in every respect, assuring efficient service at a low operating and maintenance expense.

The Howard is built in one model only, but it is adapted for use as a 12-passenger jitney 'bus as well as for delivery purposes.

Price with Body $990 F. O. B. Boston

This offers a great opportunity for profit making in your locality. Write for details of our sales plans. Do it now before a competitor gets the agency.

Robert G. Howard

87 Church Street Boston, Mass.

BESCO

Electric Furnace Castings

We are producing steel castings of highest quality for many leading concerns in the automobile and motor truck industry.

Thin-walled and intricate designed castings made possible by our electric furnace equipment which produces superior, hotter and cleaner metal than that secured from fuel melted furnaces.

Worm-Drive Housing for 3 Ton Truck
¼" to 5/16" Sections
Weight, 185 pounds—36" overall

The electric furnace equipment together with the most modern machinery for the efficient and economical production of steel wheels and castings enable us to make interesting quotations.

38 x 4 Dual Steel Wheel
(Brake Drum Cast Integral)
Weight, 285 pounds (without tires)

We invite inquiries from automobile and truck makers. Send for catalog and complete data.

Buchanan Electric Steel Co.

Buchanan, Michigan

"The Spring Is the Thing"

MATHER SPRINGS

Scientifically Heat-Treated

Genuine made only by

The Mather Spring Company

Toledo, Ohio

Mr. Truckowner:

YOU ought to KNOW
YOU can't afford to GUESS

what your trucks and chauffeurs are doing all the time—every day.

OPEN

THE

SPEEDOGRAPH

TELLS

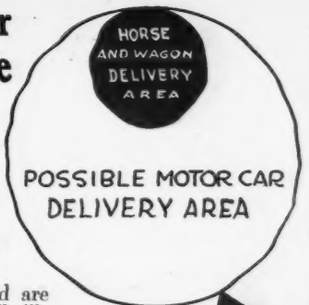
It is accurate, strong, dependable, guaranteed. Get 100% efficiency for a 2% to 5% addition to your truck investment. It is dollars for cents to you.

Let us tell you about it.

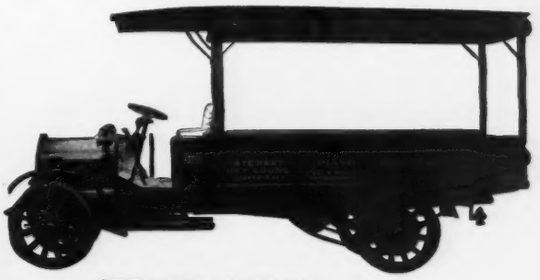
THE SPEEDOGRAPH SALES CORPORATION

11 Broadway New York City

The Right Body for Commercial Service



Highland Bodies are built for rough service, giving the *greatest strength* and maximum capacity per pound of weight. There is no rattle nor warp in Highland Bodies. They are built complete in the Highland plant, and are backed by a strong guarantee. All sills and frames are built of tough ash, and the panels are all steel, cushioned with felt.



GET OUR CATALOG

No. 10, Highland Commercial Bodies for light chassis
No. 14, Highland Commercial Bodies for heavy chassis
No. 15, Highland Commercial Bodies for Ford chassis

The Highland Body Mfg. Co.
408 Elmwood Place
Cincinnati, Ohio

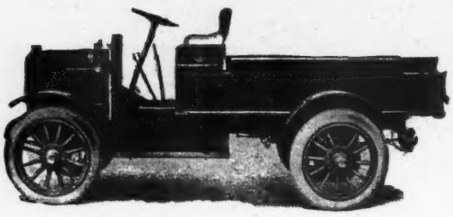
FORD AGENTS

Write today for 1915 contract with dealers' prices for Highland Commercial Bodies.

When Writing, Please Say—"Saw Your Ad. in the C C J"

Flint

About 2000 Lbs. Capacity



Another Satisfied User

C. E. Brandt & Company, Wholesale Paper and Twine Dealers, Flint, Mich., writes: "Because of the service your 'Flint' Truck has been giving us, we feel you should know how well we are pleased. It is doing the work of two horse-drawn vehicles, sometimes three. In service six days a week without any trouble. Loads run from 1200 to 2000 pounds. Averages 12 miles to gallon gasoline, and 100 miles to gallon oil."

This is the sort of service that is built into all "Flint" Trucks. They satisfy both user and dealer.

FLINT MOTOR WAGON DEPARTMENT
DURANT-DORT CARRIAGE COMPANY, FLINT, MICH.

The Latest Type
Wood Hydraulic Hoist

made to fit any chassis. Will dump a load in thirty seconds. Great time saver in hauling coal and building material.

Write for our descriptive booklets and prices

Hydraulic Hoist Mfg. Co.
172 West Fifth Street Saint Paul, Minn.
Original builders and successors to Wood Hydraulic Hoist Company

A Shim Is—

As Necessary as a Wrench

Motor truck service is hard. Bearings frequently require adjustments. Shims are thus as necessary in the shop as a wrench. Make your shims from

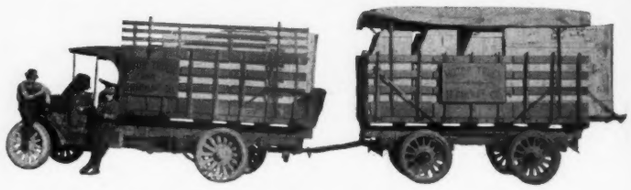
LAMINUM
the MATERIAL for SHIMS

and you'll save time, trouble, labor and expense. Don't waste time filing a solid shim! Don't fool with troublesome loose-leaf shims! Don't waste money on new shims! Be economical. Be practical. Save time, labor, expense. Use LAMINUM! It's the work of a moment—just peel off with your knife enough of these .002" laminations to get the desired thickness. Result—a smooth surface, uniform thickness, perfect adjustment, an unspoiled bearing surface—a first-class job with little work or cost.

LAMINUM comes in various forms and thicknesses. We put up a trial assortment that will just suit you. Write for prices and data.

Laminated Shim Company, Inc.
539-41 Canal Street - New York

Troy Trailers



Cutting Hauling Costs 35 Per Cent

Two Troy Trailers in the service of The Motor Truck & Terminal Company, of Los Angeles, have practically doubled the tonnage of two trucks that pull them.

Trucks carry five tons, Trailers four tons each. Gasoline expense 10 per cent. greater than truck alone. No other additional costs.

Three thousand miles with no repairs, at a ton-mile saving of 35 per cent.

Troy Trailers made in three sizes, reversible or non-reversible, rubber or steel tires, all kinds of bodies.

Send for Troy Trailer Booklet No. 4 CCJ

The Troy Wagon Works Company
Troy, Miami County, Ohio

New York 50 Church St. | Detroit 319 Hammond Bldg. | Philadelphia 702 Abbott Bldg. | London, England 49 Pall Mall

What Wrong Tires Do

These 1915 Goodyear S-V Truck Tires Overcome

Learn the results of 2,100 actual tests of 1915 Goodyear S-V Truck Tires. See why a growing host of truck owners hails these tires as the conquerors of the road.

Note how they are pressed onto the felloe band—at a minimum of 50,000 pounds. And this pressure far exceeds any strain possible in service.

Thus the Goodyear S-V Tires end creeping. And they cannot be thrown from the wheel.

They save the cost of heavy metal bands, bolts, wedges and flanges. They end all preliminary work on wheels. No other tire goes on like these—in 5 or 10 minutes—*without a single auxiliary fastening*. Hence they save the expense of carrying excess weight *below the springs*—over thousands of miles.

Wrong Tires Bulge and Break S-V's End This Trouble

No "Lay-Ups" Now

Goodyear S-V Tires end truck tire troubles.

Hence they stop dead losses that accrue when trucks are laid up by wrong tires. The resilient rubber tread, the hard rubber backing and steel channel base are welded into one. Our secret process makes this union last throughout the life of the tire.

Wrong Tires Lay Up Trucks S-V Keeps Them Going

Give Extra Mileage

Wrong tires bulge—unnatural displacement soon breaks them.

S-V Tires never do that. For the S-V shape—like an ancient pillar—distributes the heaviest load equally.

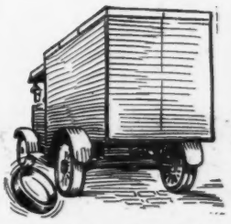
And they give you 10% more available tread rubber than most other makes.

Hence greater mileage and lower cost per tire-mile.

* * *

All makers have striven to solve these baffling problems. Goodyear experts—after 8 years of costly attempts—alone have completely triumphed.

We built, to achieve this, 74 separate truck tire structures in this one type alone. Each overcame some towering obstacle. And the 1915 S-V reaches the summit.



Wrong Tires Creep and Are Thrown. S-V Tires Never

Write for Cost Records

Let us send you full particulars and definite figures from truck users who compared results.

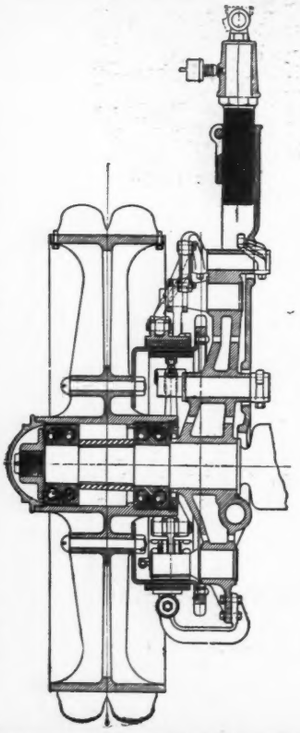
No need to pay the penalty of wrong truck tires. Let the cost book say which tire you shall specify. Address today

GOODYEAR
AKRON, OHIO
S-V Truck Tires

THE GOODYEAR TIRE & RUBBER CO., Desk 94, AKRON, OHIO

Makers of Goodyear Automobile Tires. We Make Demountable, Block, Cushion and Other Types of Truck Tires

(2200)



IN every big motor truck, the five tons or more of load, plus the great weight of the vehicle itself, must be carried on the wheel bearings. More than that, the shocks, the grinding pressures, the numberless strains, stresses and jolts due to rough roads, to change of direction and side-sway, to the use of solid tires and to overloading, combine with weight of car and load and focus at the wheel hubs, thus imposing tremendous burdens upon the bearings.

Compared with other types, the New Departure Double Row Ball Bearing is vastly superior for installation in heavy truck axles because it accepts successfully all of these loads and stresses, either radial or thrust, regardless of the angle from whence they come, doing its work with a lower coefficient of friction than does the conventional type of plain or roller bearing in similar service. The new Departure Double Row Bearing is non-adjustable, hence independent of trouble or damage due to inexperience in handling and the quality of its materials assure a service-life, practically equal to the life of the truck itself.

The rear wheel mounting here shown is ideal for heavy truck work. The inner bearing is clamped to take radial and thrust loads, singly or in combination, while the outer bearing, outer race, is allowed to float and sustains its just proportion of radial load only.

Our Catalog describes and illustrates the complete line of New Departure Ball Bearings and contains besides, comprehensive data covering their practical application and care. Send for a copy.

The New Departure Mfg. Company

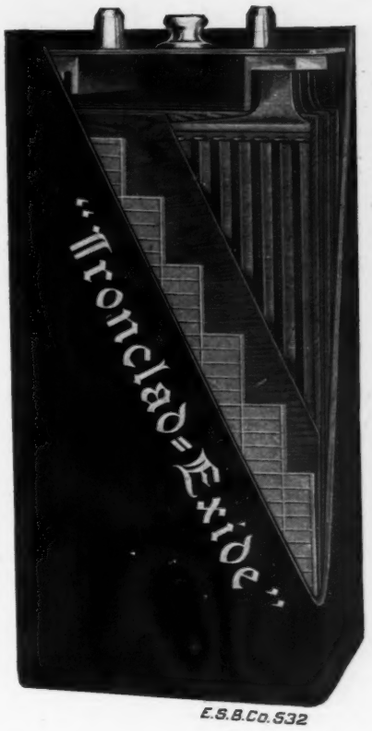
Bristol, Conn., U. S. A.

Distributors in Trade Centers Throughout the United States
Western Branch: 1016-17 Ford Bldg., Detroit, Mich.

The "PEP" in the "Ironclad-Exide" Battery

"PEP." It means—"energy," "snap," "full of life," "always on the job," "ability to do things." Think of Eddie Collins, then define it for yourself.

What's the use of using a vehicle battery that may answer your ordinary requirements only and then does not stand up when it comes to emergencies?



E.S.B.Co.532

The "Ironclad-Exide" Battery has the "Pep" that gives results—whether in pleasure or commercial "Electrics." It has "snap" and "vim"—a resourcefulness that meets emergencies. It's always on the job. It's always ready to give up whatever it has. Technically, it has the ability to discharge at high rates and maintain speed. And, furthermore, it is the battery of long life.

The "Ironclad-Exide" Battery is a business battery that appeals to business men. It's a live-wire proposition with plenty of "Pep."

These statements become very real when you read the new "Ironclad-Exide" testimonial book. Our nearest office will send you a copy at your request.

THE ELECTRIC STORAGE BATTERY CO.

Manufacturer of

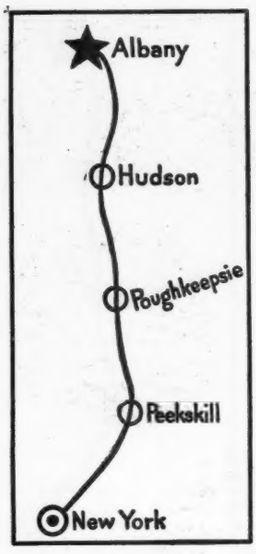
The "Chloride Accumulator", The "Tudor Accumulator",
The "Exide", "Hycap-Exide", "Thin-Exide" and "Ironclad-Exide" Batteries

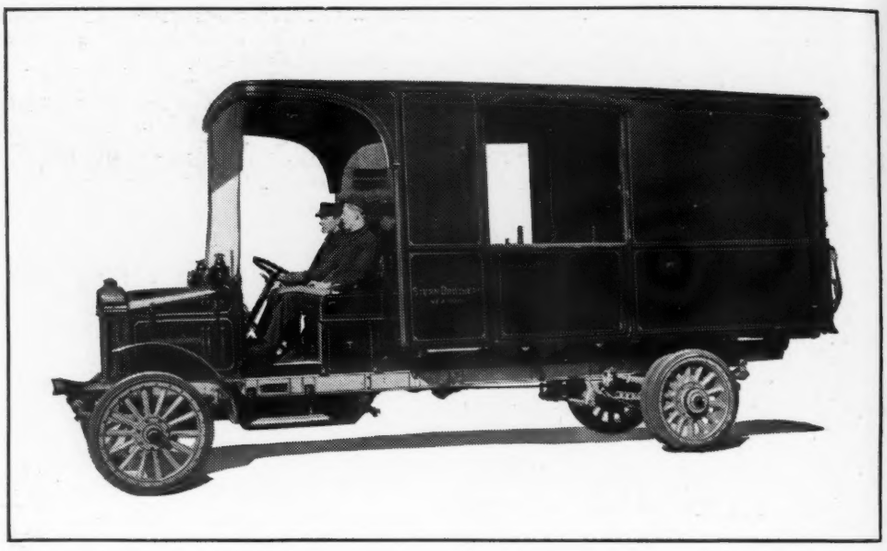
New York Boston Chicago Washington Cleveland Atlanta Pittsburgh Detroit

PHILADELPHIA, PA.
1888-1915

Denver San Francisco Seattle St. Louis Rochester Los Angeles Toronto

12 "Exide" Depots





Pierce-Arrow Motor Truck Makes New York to Albany Department Store Delivery Quicker and Cheaper than by Freight

Stern Brothers, the big New York Department Store, recently proved to their satisfaction that Pierce-Arrow Motor Truck delivery is cheaper than freight, even on a round trip haul of 348 miles.

The goods delivered in this instance to an Albany customer consisted for the most part of furniture. The usual way to deliver such material is to pack it in crates and boxes, haul to freight house and then haul from freight terminal to residence at the destination.

Stern Brothers packed the furniture carefully, but without crating or boxing, in a 2-ton Pierce-Arrow truck, and two days later, without additional handling, it was delivered to the customer free from the slightest scratch or blemish. A careful tabulation of the expense proved that this method was cheaper than freight delivery would have been with extra hauling and added cost of crating and boxing.

The Worm-Gear

All Pierce-Arrow Trucks are equipped with the worm-gear drive, which is a positive guarantee of effective service under the most difficult conditions.

The time schedule of the truck was as follows:

Left N. Y.	6:15 a.m., Oct. 26, 1914
Arrived in Albany	10:30 a.m., Oct. 27, 1914
Left Albany	5:00 a.m., Oct. 28, 1914
Arrived in N. Y.	10:30 p.m., Oct. 28, 1914

Round trip 348 miles—actual running time, 30 hours at 11½ miles per hour.

The round trip could have been made in two days, but this would have necessitated delivering at an inconvenient hour for the customer.

This record suggests interesting possibilities for department stores which maintain suburban delivery services. We shall be glad to furnish any additional information on the subject to those interested.

PIERCE-ARROW MOTOR CAR CO.
BUFFALO NEW YORK

Equipped with JONES Taximeters. A few of the 200 Taxicabs operated by Walden W. Shaw Livery Company, Chicago

Recording Instruments

of merit, proven by years of useful service and endorsed by satisfied owners everywhere

POPP (above) and **JONES** Taximeter. These instruments are universally used because of their hardiness and dependability.

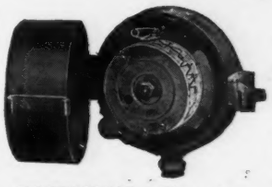
Each represents practical knowledge of motor vehicle operating problems. Each stands for the best that mechanical genius can devise.

Let us send you descriptive booklets.

AMERICAN TAXIMETER CO.
Seventh Ave. at 49th St., New York City
Service Stations in all the big cities

40 Taxis of the Fenway Garage Taxicab Service, Boston, equipped with POPP Taximeters

TRANSIMETER. Hub Odometer (Dreadnought Type) Greaseproof; stationary, and legible figures; guaranteed indestructible.



RECORDOGRAF. Gives tape record of mileage, time, starts and stops.

A REASON WHY

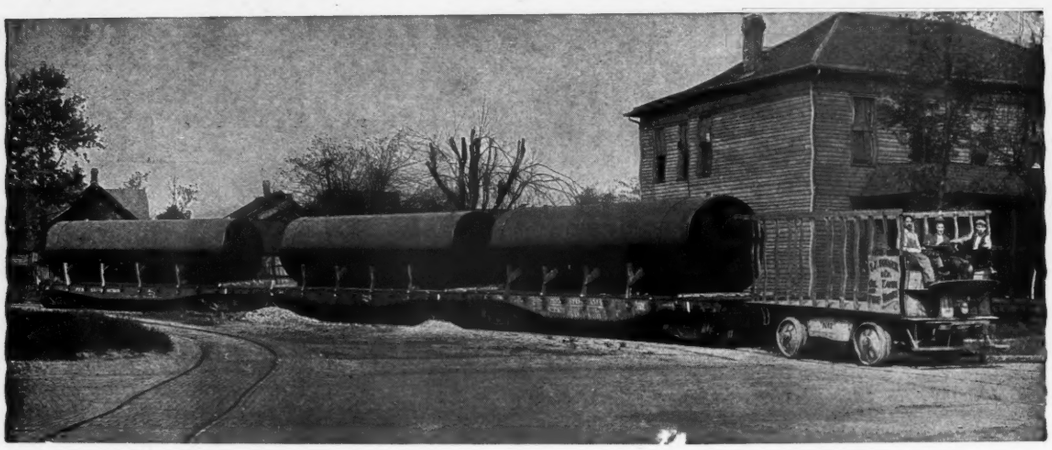
There is always a reason why a man buys a truck of some particular make. In the case of a truck driven by a Cleveland worm and wheel the "reasons why" are in evidence.

The "reasons why" to buy are the convincing reasons for putting across sales.

Have you a real "reason why" on your car that will convince and sell? If not you have to work twice as hard. Think it over a little.

The Cleveland Worm & Gear Company

Cleveland, Ohio



Gentlemen:—

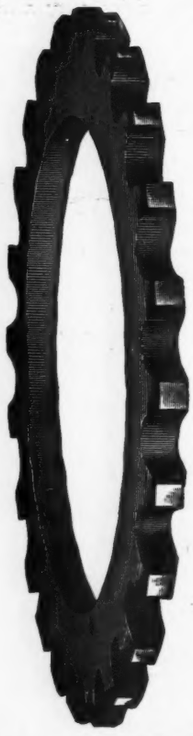
I am sending you print showing one of your Trucks hauling three cars loaded with 12,000 gallon tanks. I have never had trouble with either of the two trucks in service here. I have always kept them adjusted and well oiled and they run fine. I have pulled seven cars at one time with one truck, four loaded and three empty, which I think is a good test.

Yours truly
JOHN F. DETRO
Operator for
S. F. Bowser Co.

To Users of Trucks: The truck having this record and capacity should interest you because of the big money it will save on your transportation and haulage costs. If it does, let us figure on your requirements.

COUPLE-GEAR FREIGHT-WHEEL CO., 420 Buchanan Ave., Grand Rapids, Mich.
Boston, 541 Tremont Street — New York, 30th Street and 11th Avenue — Philadelphia, 522 Weightman Building

4-Wheel Drive — COUPLE-GEAR TRUCKS — 4-Wheel Steer



CULLMAN SPROCKETS and Differentials

in stock and to order.

Send for catalog and let us quote you on your requirements.

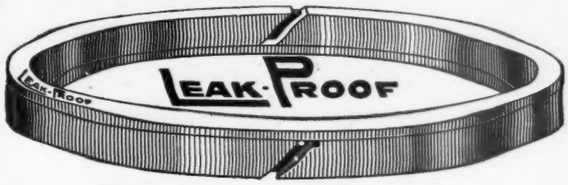
CULLMAN WHEEL COMPANY, CHICAGO
1351 GREENWOOD TERRACE

When Writing, Please Say—"Saw Your Ad. in the C C J"

There's no leak proof ring but the LEAK-PROOF Ring — insist

Cut the Cost of Truck Operation

You may think you've worked your costs down to bed-rock, and no further economies are practicable excepting at a sacrificing of efficiency. Well—frankly—you are wrong there, if you've neglected to equip those trucks with



Piston Rings

Made by McQuay-Norris Mfg. Co.

And, besides, you're overlooking a chance to very materially increase the reliability of this service.

LEAK-PROOF Piston Rings ensure the continuous production of a motor's maximum power output. They prevent all waste of gasoline and lubricating oil, eliminate the troubles caused by excessive carbonization, reduce cylinder and motor wear.

They are mechanically correct in design, having neither the unsealed openings nor unequal bearing of all one-piece rings, nor the weaknesses of the multiple-section type. They are strong, enduring, wonderfully elastic—easy to adjust.

Send for FREE Book

"To Have and To Hold Power." It tells all about piston rings and why you should equip your motor with LEAK-PROOF. How it will pay you in fuel economy and prolonged motor life. Write for it.

In Use on Over 300,000 Motors

TRADE MARK REGISTERED

PATENTED

Angle to angle interlocking construction identifies LEAK-PROOF — insist

Sold by all up-to-date dealers, garages and repair shops

MANUFACTURED BY

McQuay-Norris Mfg. Company

Dept. C, St. Louis, Mo.

CANADIAN FACTORY: W. H. Banfield & Sons, No. 120 Adelaide St. West, Toronto

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SAN FRANCISCO, 164 Hansford Bldg.
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Look for the name LEAK-PROOF stamped on the Ring

Warner Gear Co. Transmissions

Built for Constant Service

WARNER

"THE RECOGNIZED STANDARD"

Model 84F four-speed transmission for 1-2 ton worm or internal gear drive

TRANSMISSIONS
STEERING GEARS
DIFFERENTIALS
CLUTCHES

WARNER GEAR CO.
MUNCIE, IND.

Detroit Office - - - 967 Woodward Ave.

Veeder
HUB ODOMETER

It certainly is bad business to invest heavily in a motor truck installation and not take measures to insure getting the utmost service out of it.

Yet this is precisely what many business concerns have done and are doing. They buy trucks, turn them over to drivers to operate under the loosest kind of supervision and then wonder why the installation is not as efficient or profitable as they believed it would be.

If you want to make your trucks pay you must get the maximum mileage out of them on proper business. You can be sure of doing this only by installing on each truck an accurate recording instrument.

The Model K Veeder is the one that will best answer your purpose. It is a compact, rugged, durable instrument, and has hardened steel wearing parts. It withstands vibration and the terrific shocks and jolts to which trucks are constantly subjected.

The Veeder is absolutely accurate, it records forward regardless of whether the truck runs forward or backward, it cannot be disconnected or made to give a false record. It will give you the accurate mileage record you need to figure costs. Spending $20 for one is a mighty good investment. Write for details.

The Veeder Manufacturing Company
10 SARGEANT ST., HARTFORD, CONN.

Makers of Cyclometers, Odometers, Tachometers, Tachodometers, Counters and Small Die Castings

T. H. CRANSTON & CO.
56 E. Randolph St., Chicago

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543 Golden Gate Ave., San Francisco, Cal.

FULLER
Transmissions

Types:

Unit
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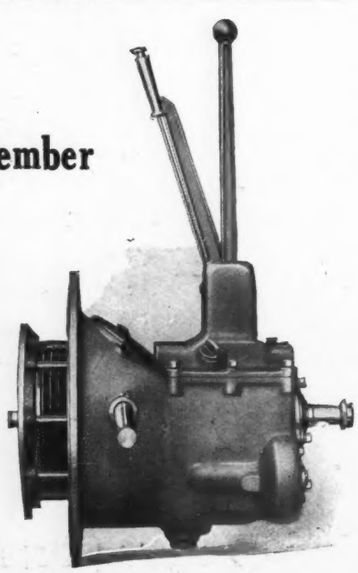
Nickel Gears
Ball Bearings
Dry Disc Clutch
Center Control

Trucks
¾ to 2 Tons
2 Sizes



Complete details on request

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KALAMAZOO, MICH.

Accurate Information
about makers of automobiles, their parts, accessories, tires, shop and factory equipment

All of this—telling the buyer what he wants to know when he wants to know it—is but one of the features of the

CHILTON AUTOMOBILE DIRECTORY

Over 1200 separate classifications cover every branch of the automobile industry and tell you every source of supply for any particular article you may wish to buy. It is all given in such compact, accessible form and is so unfailingly accurate that it is known in the trade as

Every Buyer's Buyers' Guide

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Issued quarterly—January, April, July, October
April issue now on sale. Price per copy - - - $1

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CHILTON COMPANY, Market & 49th Sts., Phila.

LAVIGNE STEERING GEARS

The Peer of Gears

For quality Motor (cars) (trucks)

We are Steering Gear specialists.

We command the largest percentage of the Steering Gear business.

All of our product is made of the highest grade materials, all working and wearing parts made from alloy steels, pack hardened, water and oil treated, ground to gauges. Insuring interchangeability, easy steering and irreversibility.

The Value is honest
The Judgment expert
The Sale sincere

Write for detailed information.

LAVIGNE GEAR CO.

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G. V. ELECTRIC TRUCKS

SIX MODELS: 1,000 POUNDS TO 5 TONS

Over 4,000 in use
Catalog on request

General Vehicle Company, Inc.

GENERAL OFFICES AND FACTORY:
LONG ISLAND CITY, NEW YORK

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2503

Engineers

have condemned the old-style center-bolt springs for use on Motor Trucks with Worm-Drive Construction, because the additional stress of such construction causes the center bolt to shear and the spring to break at the center.

TUTHILL TITANIC SPRINGS

HAVE NO CENTER BOLT

When your motor truck gets into actual service it is up against a pretty stiff proposition.

The man in the pleasure car picks his way, but the truck driver goes ahead regardless of road conditions.

In the Tuthill Titanic Unbreakable Spring you get the greatest amount of strength with the least possible poundage, commensurate with the proper factor of safety.

Best Construction

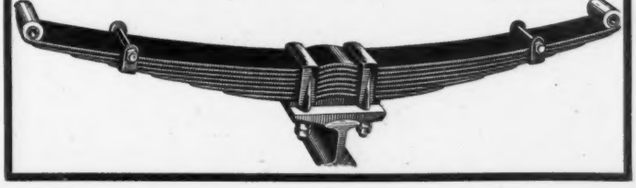
The Tuthill Titanic Spring is the best construction for motor truck springs, because it affords the most positive means of attaching to the axle—it eliminates the possibility of center-bolt shearage and consequent breakage through the center—it does away with center motion.

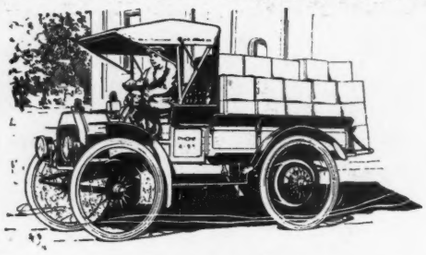
Write Today

Our Engineering Department has some facts and figures you should get—write them today.

TUTHILL SPRING CO.

774 Polk Street **Chicago, Ill., U.S.A.**





Facts That Speak Volumes

The tremendously increased efficiency of motor trucks over horse-and-wagon equipment, and the rapidity with which shrewd business men are changing over to the truck, is seen in these figures: Three years ago May 1 there were 799 trucks in use in Chicago — today there are over 4200.

By far the greater part of this increase consists of light draft trucks that get about swiftly with medium loads. Seven out of every ten average business men can make good use of and increase their profits with a light truck, provided they buy wisely and carefully.

INTERNATIONAL MOTOR TRUCKS

cover this country in greater numbers than any other truck on the market. That is the big fact. Shrewd buyers have demonstrated by their choice in the last eight years that the International is the most profitable economical light truck made.

The truck that has proved best for so many business men is probably the one it will pay you to buy. At least, it deserves consideration. Send for a readable catalogue telling all about it.

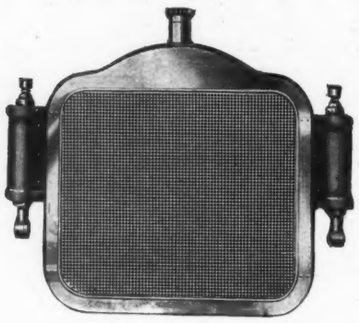
International Harvester Company of America
(Incorporated)
182 Harvester Building Chicago U S A

FEDDERS RADIATORS

Sometimes it takes a year or two for the quality of Fedders Radiators to become apparent.

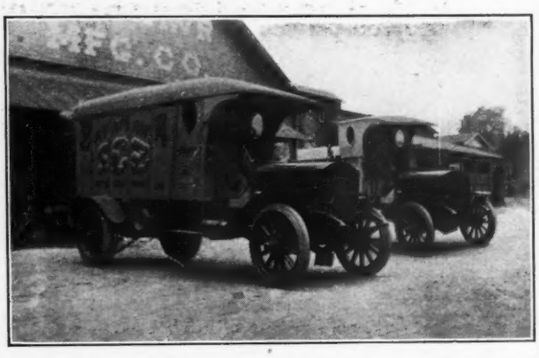
Slowly but surely the absence of heating troubles brings to the motorist whose car is Fedders-equipped the realization that he has a radiator better than the ordinary.

The realization of Fedders Quality brings about satisfaction and there it stops. Complacent satisfaction is the hardest thing in the world to disturb—witness the continued patronage of many leading car makers whose regard for Fedders Quality indicates the opinion of their customers.



FEDDERS MFG. CO., Inc.
BUFFALO NEW YORK

ROWE MOTOR TRUCKS



are used in every line of business and in every case have proved the most economical means of hauling.

A Rowe Truck will save you money in transporting your merchandise.

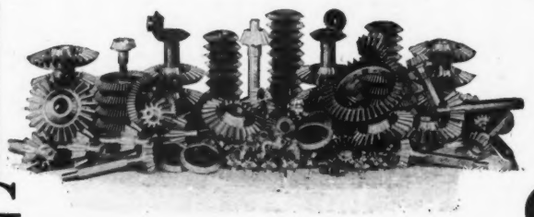
The Rowe Truck is guaranteed to give

Continuous Economical Operation

Worm or chain drive. One to five tons capacity

Rowe Motor Manufacturing Co.
Downingtown, Pa.

GEARS



GEARS GEARS

Bevels Mitres Worms
Spurs Spirals Racks
Sprockets

We produce in quantities to specification cut and planed Gears and Pinions of all descriptions.

As a source of supply in connection with *Gears* and *Gear Cutting*, we are considered an asset by many of the best interests. They buy from us year after year, because these advantages are afforded:

(1) *Unexcelled facilities.*
(2) *The highest standard of workmanship.*
(3) *Years of experience as specialists in gearing.*
(4) *A most careful selection of materials.*
(5) *Particular attention to deliveries.*

THE VAN DORN & DUTTON CO.
Gear Specialists
CLEVELAND (Sixth City)

GEARS

BESSEMER TRUCK

Illustration shows Model "C" which is equipped with either pneumatic or solid tires. There is more real sturdiness built into this than in any other one-ton truck on the market.

Three Models

MODEL C	MODEL A	MODEL D
1 Ton Capacity	1½ to 2 Ton Capacity	1½ to 2 Ton Capacity Worm Drive
25 H. P.—$1250	30 H. P.—$1800	30 H. P.—$2300

DEALERS: Write us about the special proposition we have for you. The Bessemer line enables you to handle every truck requirement.

BESSEMER MOTOR TRUCK CO.
GROVE CITY, PA.

Pyrene
TRADE MARK

FIRE EXTINGUISHERS

"The Most Efficient Fire Extinguisher Known"

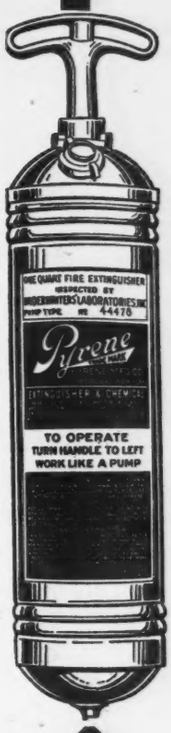
Is recognized by fire engineers as a superior, scientific method of extinguishing dangerous incipient fires wherever they occur—in the home, the factory, the power station, the railway car, the automobile and the motor boat.

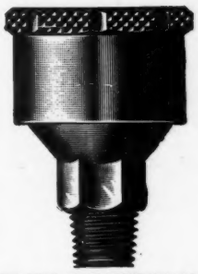
Brass and Nickel-plated Pyrene Fire Extinguishers are included in the lists of Approved Fire Appliances issued by the National Board of Fire Underwriters, and are Inspected, Tested and Approved by and bear the label of, the Underwriters' Laboratories, Inc.

At Leading Dealers Everywhere

Write for Literature

The Pyrene Mfg. Co.
52 Vanderbilt Ave., New York





PLAIN COMPRESSION
(Patented)

Empress

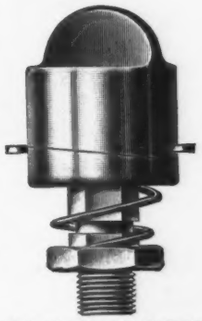
BRASS AND STEEL

GREASE AND OIL CUPS

WE MANUFACTURE
a full line of Plain, Leather Packed, Ratchet, Marine, Spring Compression, and many other styles of Grease Cups.

Our line of Oil Cups is equally satisfactory and complete.

Catalogue on Application



WING TOP RATCHET
(Patented)

Bowen Manufacturing Co.
AUBURN, N. Y.

SCHWARZ WHEELS

Patented Aug. 25th, 1904

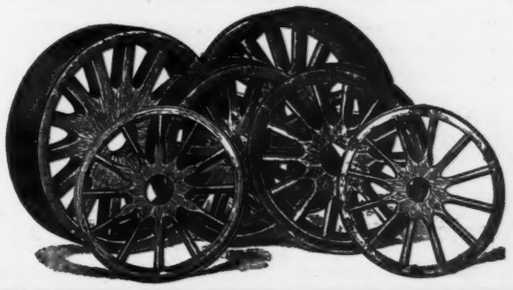
Used by the makers of most quality trucks, because they offer the utmost in strength, safety and economy.

Desired by truck buyers, because they are a known product whose superiority has been conclusively demonstrated.

Wanted by dealers, because they are an assurance of quality and make a truck easier to sell.

"Bear the Burden"—a booklet—will tell you why this is so—send for it.

The Schwarz Wheel Co.
Frankford Philadelphia Penna.



Stegeman

PRICES REDUCED

—ON—

STEGEMAN TRUCKS

Never before has it been possible to obtain trucks of this high quality at such low prices.

Specifications same as before: Continental motor, Brown-Lipe gears, Timken bearings, multiple disc clutch, Stromberg carburetor, Eisemann magneto, *guaranteed springs. etc.—all "The World's Best Units."* Simplest, Strongest and Easiest riding trucks for their capacities, on the market.

A reduction of $200 to $350 from old prices—

1 -ton - - -	$1600.00
1½-ton - - -	1900.00
2½-ton - - -	2500.00
3½-ton - - -	3000.00

Send for descriptive literature and *you* be the judge of the value.

Stegeman Motor Car Co., MILWAUKEE WISCONSIN

REG. U. S. PAT. OFFICE

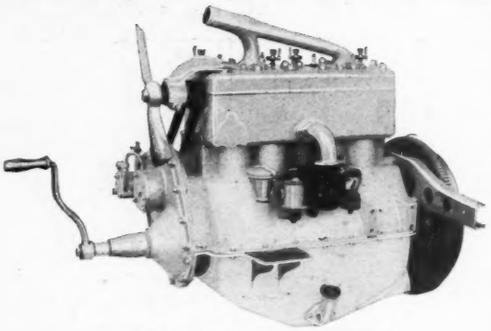
The wise motorist knows, as well as we know and as well as automobile engineers know, that the magneto is the most effective ignition equipment, and that cheapness is the sole recommendation for any other form of automobile ignition.

SPLITDORF ELECTRICAL CO.

NEWARK, NEW JERSEY

THE RUTENBER MOTOR

This new Model 20 is an ideal motor for light capacity trucks



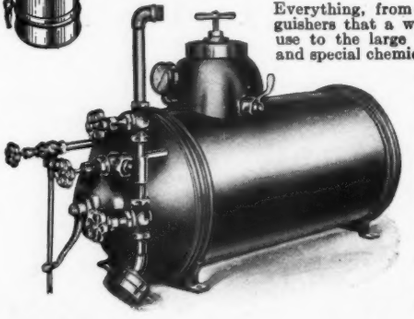
Model 20, 3½ x 5, 4 cyl.—30-35 H. P.
For Trucks of ½-1½ Ton Capacity

This is a 1915 product designed especially to give a high-grade, dependable motor at low cost in quantities, for commercial cars. It is an efficient high-speed motor with extra large bearing surfaces, plain and simple design, strong, durable and possessing characteristics most desired in this kind of service. Write us for complete information.

The Rutenber Motor Company

Marion - - Indiana

DEPENDABLE Chemical Fire-Fighting APPARATUS



Everything, from the hand extinguishers that a woman or child can use to the large Chemical Engines and special chemical tanks for Fire Department service.

Into each is put material and workmanship that cannot be excelled. Designs are shown by actual use to be beyond improvement.

Result: Perfect and immediate action when needed, no deterioration from lack of use or age.

All Our Tanks Are Made of Copper

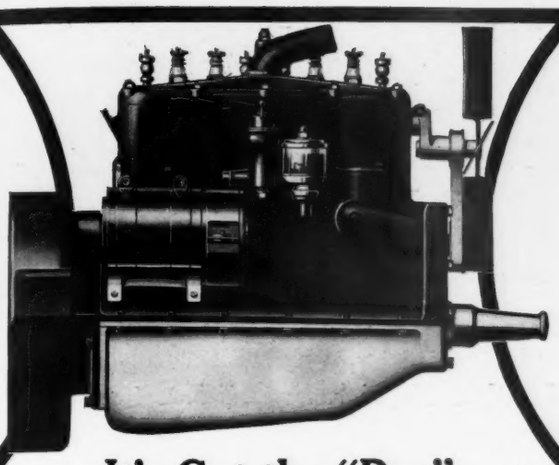
The name **"CHILDS"** stands for perfection.

Chemical Tanks for Fire Department or other service made to order.

Write for our Complete Catalogue and interesting talk on Fire Apparatus.

O. J. CHILDS CO., Utica, N. Y.

MANUFACTURERS FIRE APPARATUS



It's Got the "Pep"

that conquers mud, sand and hills, that makes it stand up to the hard grind of truck work, day after day, week after week, month after month. It's a

Wisconsin
CONSISTENT

Truck Motor, and it's got a reputation to sustain. Every Wisconsin Motor has behind it a long record of consistent performance. Write for illustrated catalog.

WISCONSIN MOTOR MFG. COMPANY
Sta. A, Dept. 233 Milwaukee, Wis.

Part of Fleet of 11 Stewarts in the Service of the Buffalo News

Stewart
Delivery Trucks

Big Dealers Handle the Stewart

Many of the most successful, most progressive and most alert dealers in the country have the Stewart agency. They are men of good business judgment. They have chosen the Stewart to handle because it is right; because it gives wonderful service; because it is built by a strong company that maintains a fair attitude toward dealers.

In addition to Stewart light delivery trucks our line now includes the distinctive Stewart "Six," a 7-passenger, high-value, fully-equipped touring car.

Get in touch with us about the new Stewart dealer proposition. Better do it now—today.

Stewart Motor Corporation, Buffalo, N.Y.
Makers of Pleasure and Commercial Cars

DENBY

Motor Trucks

Designed to embody what the user ought to **buy**—not what the manufacturer wants to **sell.**

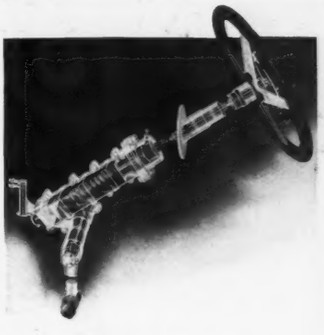
Built by men who have mastered motor-transportation problems through years of successful experience.

Dealers find the Denby a truck that requires the minimum of argument and gives the maximum of satisfaction to their customers.

Four models—1500 lb., one ton, one and a half ton, and two ton.

Denby Motor Truck Company
28 Dubois Street, Detroit, Michigan

ROSS
Steering and Differential GEARS
will help sell your trucks



They are STANDARD on good motor truck construction

INVESTIGATE
our new complete line of fore and aft steering gears

Enormous bearing surfaces
Perfect lubrication
Best material throughout
Finest workmanship

Built in the largest and newest steering gear factory in the United States.

WRITE FOR CATALOG

ROSS GEAR & TOOL COMPANY
790 Heath St. :: Lafayette, Ind.

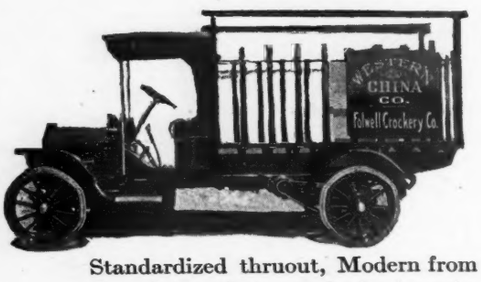
CRAMP BUSHINGS

Bushings, of all things, should be of proven quality. Truck Builders who aim to build faultless service and long life into their cars take no chances, they use CRAMP BUSHINGS, made of the famous Cramp Special Bearing Bronze.

Cramp Bushings have highest compressive strength and real anti-friction qualities. We are prepared to furnish bushings machined complete, ready for installation or the ingots and rough castings as you may desire.

Endow your car with the Cramp reputation by specifying Cramp Special Bearing Bronzes. Write us about it.

WM. CRAMP & SONS SHIP & ENGINE BUILDING CO., Philadelphia, U. S. A.



DEALERS, ATTENTION!

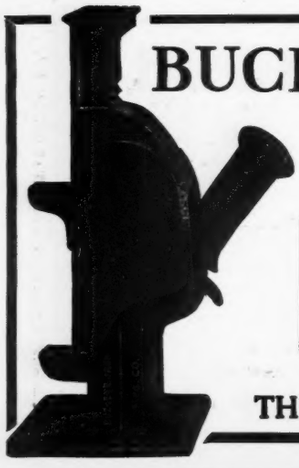
MODERN

THE BOWLING GREEN MOTOR CAR COMPANY

TRUCKS FOR 1915

Standardized thruout, Modern from radiator to tail lamp, built in chain and worm-drive models. Just the truck to get the business in your territory. *Live dealers should write for catalog.*

THE BOWLING GREEN MOTOR TRUCK CO., Bowling Green, Ohio



BUCKEYE Motor Truck Jacks

Buckeye Motor Truck Jacks are safe, reliable and made to stand the wear and tear for which they are intended. They are fully guaranteed, and cannot possibly drop with a load. They are made from Steel Drop Forgings, best finish and workmanship throughout.

Get our prices before you place your orders for jacks, we can save you money.

No.	Height Bar Down	Raise of Bar	Height Bar Up	Weight	Capacity		List Price
7	11¼"	6½"	18"	16 lbs.	2½ tons	with formed handle	$10.00
13	14¼"	7½"	20½"	26½ "	3 "		15.00
14	14¼"	7½"	20½"	33 "	5 "		16.00
9	11½"	6"	17½"	10 "	1½ "		6.00

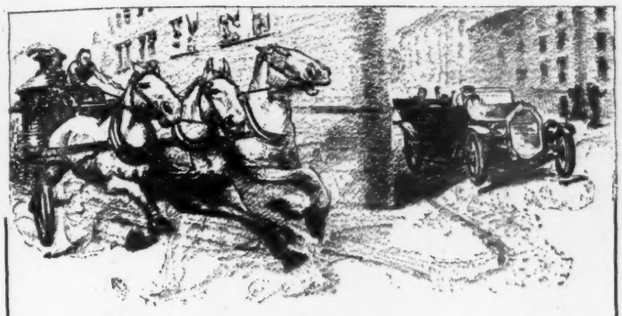
Write today for descriptive catalog. Made only by

THE BUCKEYE JACK MFG. CO., Alliance, Ohio

FRAMES

THE PARISH & BINGHAM CO.
CLEVELAND, OHIO

Our Entire Engineering Force is at Your Disposal



No Danger—If the Brakes Hold

You who sell brake-lining will multiply your sales and at the same time do the right thing by your customers, if you will make the following two suggestions *your rules:*

1. Test the brakes and brake-lining on every car that comes into your hands. Not a slow-stop, but a *real* test—an emergency test.
2. Sell Thermoid because it is 100%—first to last—because Thermoid can be trusted with LIVES.

Thermoid
HYDRAULIC COMPRESSED
Brake Lining-100%

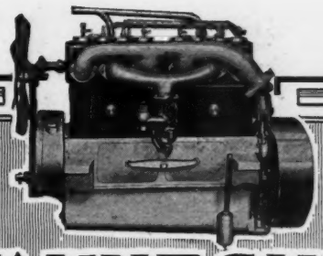
Thermoid is honest brake-lining all through. There's the same gripping friction at the core as on the outside. It is forced by hydraulic compression into a substance of uniform density and, though worn paper-thin, it still grips and holds instead of being loose and stringy inside with *just a thin friction surface,* like the ordinary, loosely-woven brake-lining.

Cannot be burned out nor affected by oil, heat, water, gasoline, dirt.

Watch the brake-lining—guard safety with 100% Thermoid

THERMOID RUBBER CO.
TRENTON, N. J.

Our Guarantee: Thermoid will make good, or WE will.



WAUKESHA

4¾×6¾ LONG STROKE TRUCK MOTOR

WHEN you equip your truck with the Waukesha Long-Stroke Truck Motor you take the right step toward making your guarantee of efficiency good.

The Waukesha is not an all-purpose motor. It is built to give maximum efficiency in trucks only. It is not a result of the demand for truck motors — but the result of years of study in truck motor requirements. Built to give absolutely sure efficiency under the very heaviest of truck service, it successfully overcomes all the obstacles in the way of truck efficiency under average, everyday working conditions.

The Waukesha crankshaft has a tensile strength of 70 tons to the square inch—the bearings have 3 times the wearing qualities of ordinary bearings. You don't absolutely need all this strength—but it's there in case of emergencies.

Learn why the Waukesha is efficient and durable. We'll appreciate your request for information.

WAUKESHA MOTOR CO.
WAUKESHA Dept. A. WISCONSIN

AN EXCEPTIONAL MOTOR

RYERSON REINFORCED
GLYCO PATENTED SKELETON CONSTRUCTION
BEARINGS

for automobile, motor boat, tractor and stationary gas engines and other machinery where a removable and quickly replaceable bearing is desired.

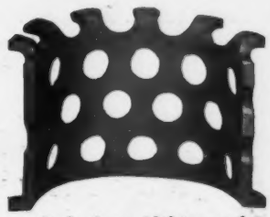
Finished Bearing

A reinforced Babbitt bearing embodying enormous **strength** and **resistance.** A steel or bronze skeleton embedded in the **Babbitt** changes weakness to strength—just what steel reinforcement does to concrete.

Section showing reinforcement

Reinforced and interlocked throughout body and flanges —skeleton and Babbitt one homogeneous mass.

Demand Ryerson Reinforced Bearings in those vital parts of your engine—the connecting rod and main shaft bearing. The whole engine is no stronger than its weakest part. Inferior bearings make an inferior engine.



Steel or bronze skeleton, used in combination with whatever Babbitt metal is preferred.

JOSEPH T. RYERSON & SON
Iron Steel Machinery
Chicago New York St. Louis

ON THE JOB EVERY DAY

Day in and day out the year round your truck must be ready to do its work and do it at the least possible expense.

Selden Trucks

have invariably given this kind of daily service to their owners because they are built to stand the strain of continuous work. Every working part to the last bolt is larger and stronger than corresponding parts of any other 3000-lb. truck. We invite comparison.

$500 Puts the $2000 Selden Truck into Service

The balance may be paid at the rate of $125 per month. The Selden Sales Plan as indicated above has proven very satisfactory to users and dealers alike. It will pay you to investigate the true merit of the Selden Truck and the plan by which it is sold.

SELDEN TRUCK SALES CO.

415 East Ave.
Rochester, N. Y.

Spicer Universal Joints

Universally Accepted as the Most Dependable Flexible Connection Known to Motor Car Practice

Oil-Tight Dust-Proof

PARTS INTERCHANGEABLE

Spicer Manufacturing Company
Plainfield, N. J.

Sales Representatives:
K. Franklin Peterson, 122 S. Michigan Blvd., Chicago
L. D. Bolton, 2215 Dime Savings Bank Bldg., Detroit
Foreign: Benjamin Whittaker, 21 State Street, New York

B-A-Gramm's Trucks

appeal to the man who has had experience in the use of motor trucks.

To him their quality points, the individual clutch transmission, guaranteed springs, self-starter, etc., mean a definite saving in operating costs.

The full line, 1 to 6 tons, with all its features, is described in our complete catalog, which will be sent you on request.

THE GRAMM-BERNSTEIN COMPANY
Dept. 1 LIMA, OHIO, U. S. A.

ESTABLISHED 1909 **INCORPORATED 1914**

SIX YEARS OF SUCCESS

The United States Motor Truck Co.

Cincinnati, Ohio

OFFERS A FINE OPPORTUNITY TO DEALERS

GET OUR PROPOSITION

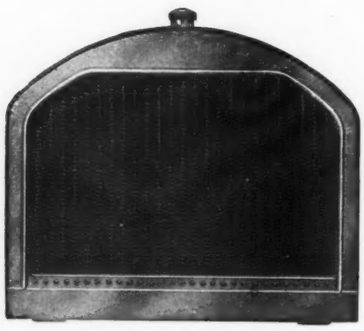
Made in
2, 2½, 3 and 4 ton
Capacity

THE correctness of its construction combined with best quality materials and right prices, make the U. S. a splendid value for buyers and a good proposition for dealers.

SPECIFICATIONS AND PRICES ON REQUEST

CANDLER TRUCK RADIATORS

Thoroughly Reinforced



Unusual Strength—High Efficiency

The Candler Special Truck Radiator is the strongest construction on the market to-day. It is highly adapted to truck use, by virtue of its efficiency, strength and durability, non-leakable and non-freezable features as well as its ease of repair.

We invite correspondence from those interested in a Practical and Serviceable Truck Radiator.

CANDLER RADIATOR COMPANY
DETROIT, MICH.

Another FEDERAL Endorsement

P. S. NICHOLS
Commercial Car Manager
Pacific KisselKar Branch
Federal Distributors

SAN FRANCISCO · LOS ANGELES · OAKLAND

THE PACIFIC KISSEL KAR BRANCH

SAN FRANCISCO, CAL.

FACTORY AND BRANCH CORRESPONDENCE

PLEASE ADDRESS ALL COMMUNICATIONS TO THE COMPANY AND NOT TO INDIVIDUALS

January 2, 1915.5.

Federal Motor Truck Co.,
Detroit, Mich.

Gentlemen:

In looking forward to the great Exposition year, we cannot help but reflect upon the Federal business that we have obtained since taking on the account. Within the last two and half years our Company has disposed of about three hundred Federals and from every viewpoint we can truthfully say that the account has been very satisfactory. We can add, too, that should we not have met unscrupulous competion this volume of business would have been double. However, you know that we maintain one price, meet competition honestly and, above all, give service.

We find it very easy to get business with this truck and after the business is obtained, the service cost is very slight, as all of the trucks sold have stood up wonderfully well.

We are looking forward to an exceptional business for the 1915 season.

Yours very truly,
THE PACIFIC KISSELKAR BRANCH,
P. S. Nichols
Commercial Car Manager.

"Within the last two and a half years we have sold about three hundred Federals—we find it very easy to get business with this truck."

This is the kind of endorsement Federal dealers give the whole Federal organization.

You want a selling proposition like the Federal—it means a good, substantial business for you and lots of satisfied customers. When everything is said and done it really is the service given the Federal truck itself, backed by the dealer and factory service that sells the next Federal.

The financial stability, manufacturing ability and record for fair dealing of the Federal Motor Truck Company is second to none. It is an organization that is a source of pride and profit to Federal dealers.

Get in touch with us about the situation in your territory.

FEDERAL
MOTOR TRUCK CO.
112-120 LEAVITT STREET
DETROIT, MICHIGAN

Russel Axles

Internal Gear Drive

The Test of Efficiency

The above illustration shows a well-known motor truck, equipped with the ***Russel Internal Gear Drive Axle,*** carrying a load of 2,100 pounds and towing a six-cylinder touring car.

It was the first vehicle, motor-driven or horse-drawn, to traverse this road for a period of ten days.

The ***Internal Gears*** of the ***Russel Axle,*** being ***well protected*** from the mud enabled this truck to go through mud up to the axles without mishap. It would be impossible for the chain and sprocket driven truck to operate under such conditions.

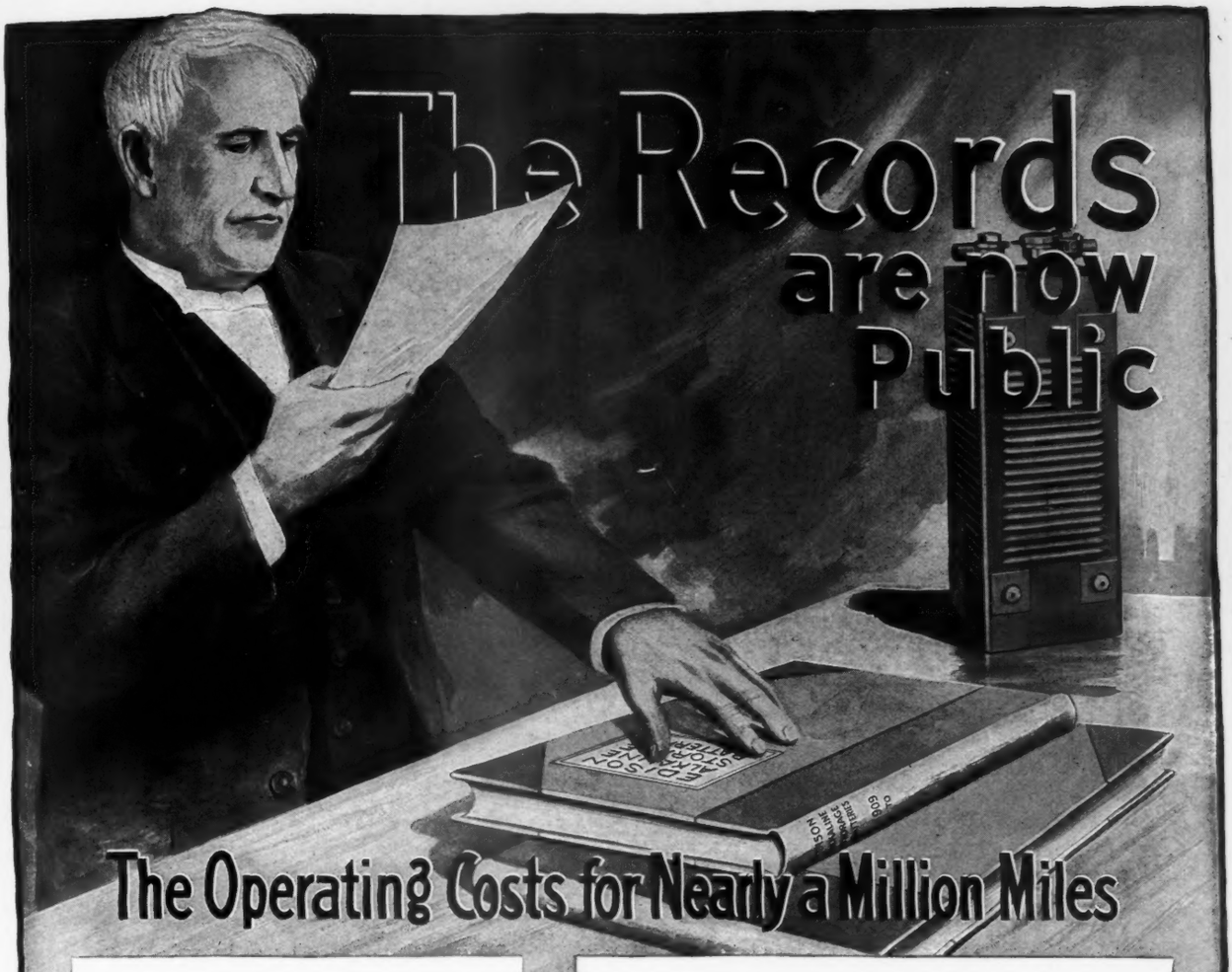
The ***Russel Internal Gear Drive Axle*** affords ***unusual ground clearance***—more than is possible on any worm gear axle due to its bulky housing.

The road shown above is only a sample of the character of roads trucks traverse all over the continent. On one day they were only able to make 27 miles and had to use low gear the entire distance.

This particular truck after traversing 3,000 miles across the American continent was thoroughly inspected and found to be in excellent condition, the internal gears being made of alloy steel and specially hardened, showing no appreciable wear.

The Russel Internal Gear Axle is the most durable and most efficient rear drive axle for motor trucks on the market today.

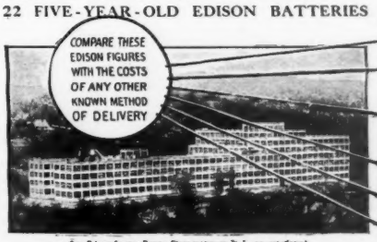
Russel Motor Axle Company
North Detroit, Michigan



I CLAIMED that the **New Alkaline Storage Battery** would make the Electric Vehicle the cheapest means of Street Transportation, but I had only my private tests to satisfy me. Today thousands of Edison Batteries in thousands of Trucks and Delivery Wagons are making Operating Records that are easily investigated by all. After the four or five years of hard service that many of these vehicles have had, is it possible to deny that my claim is proved?

Thomas A. Edison

HERE IS ONE RECORD—A REPORT—ON 22 FIVE-YEAR-OLD EDISON BATTERIES



The Edison Storage Battery Plant at Orange, N. J., was not affected by the fire in the Edison Phonograph Works on December 9th

Write for Bulletins on the use of **Edison Batteries** for Lighting Country Houses, Ignition and Lighting of Gasoline Cars, Yacht Lighting, Railway Train Lighting and Signaling, Telephone, Telegraph and Wireless *and High-priced or Low-priced Passenger Electrics.*

Edison Storage Battery Company
Orange, New Jersey

Distributors in { New York Chicago Boston Cleveland Washington / San Francisco Los Angeles Portland, Oregon Seattle

ADAMS EXPRESS COMPANY

242 WEST 47TH STREET

MOTOR VEHICLE DEPARTMENT
GEORGE STEVENS
SUPERINTENDENT

NEW YORK, December 7th 1914

Edison Storage Battery Company,
Orange, N. J.

Attention of
Mr. A. Bachman,
V.P.& Genl Mngr.

Gentlemen:-

Thank you for consenting to extend from five to six years the conditions of your guarantee regarding renewal of positive plates.

The average operating cost per battery per month of the twenty-two trucks at Indianapolis, equipped with Edison Batteries in November 1909 and averaging about 660 miles per month, is as follows:-

YEAR	BATTERY MAINTENANCE (Refilling, new solution, watering, cleaning, all repairs, inspection, etc.) Material	Labor	CURRENT (Purchased by meter)	TOTAL
1910	$3.47	$4.10	$10.05	$17.62
1911	3.41	4.10	8.93	16.44
1912	3.41	4.10	9.90	17.41
1913	2.86	4.10	8.17	15.13
1914(to Oct.31)	3.11	4.10	9.50	16.17

The average total operating cost per battery per month has, therefore, been $16.55 for a period of five years. In this time the average mileage per truck was about 40,000, which reduces the operating cost to $.02½ per mile. The batteries are still in service.

Yours very truly,

Geo. Stevens

GS-HRW

Superintendent

Continental World-Wide Uniformity

Day after day, year after year, a ceaseless stream of currency issues from the United States mint.

In each series all pieces are identical. There must not be the slightest variation, because based on this unfailing uniformity rests the structure of the nation's business.

The product of the mint is the standard measure for all value.

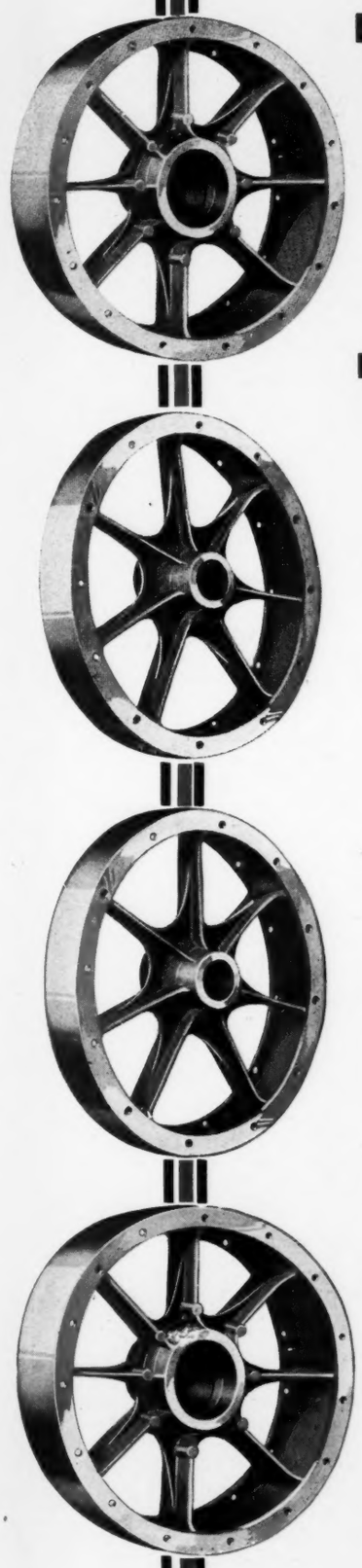
Continental Motors

Day after day, year after year, a constant stream of motors issues from the Continental factories.

In each series all pieces are identical. There must not, there cannot, be the slightest variation, because based on this unfailing uniformity —this steadfast multi-tested and soundly inspected accuracy— rests Continental prestige among 128 great motor car and motor truck manufactories, and the positive service that 150,000 motorists have bought and paid for.

The product of the Continental is the standard — the **gold standard**—of motordom. Insist upon a Continental Motor in the truck you handle.

Continental Motor Mfg. Co.
Detroit, Mich.
Largest Exclusive Motor Builders in the World
Factories: Detroit, Muskegon



WEST'S Cast-Steel WHEELS

for Heavy-Duty Trucks

There are very potent reasons why you should place West's Cast-Steel Wheels on your heavy-duty trucks. Some of these reasons are as follows:—

They are the most serviceable and economical wheels made.

They are designed and produced by experienced engineers and are guaranteed to withstand the severest use.

They are both stronger and lighter than wooden wheels designed to carry the same load.

They will not warp, shrink, twist or loosen, like wooden wheels.

They are cast in one piece and have no joints to open, no bolts to shear, no rivets to break.

They are impervious to climate and weather and will not give any kind of trouble.

They do not get out of true like wooden wheels and cause excessive tire wear.

They will save at least 25% of your tire bills.

These are all practical considerations which deserve your careful consideration. We can make any size or form of cast-steel wheel to your specifications. There are over 8000 of these wheels in successful use today.

If you want to know what buyers think of them write us for the names of some of those in your vicinity who are enthusiastic boosters of West's Cast-Steel Wheels.

The West Steel Casting Co.

Cleveland, Ohio

Chilton Automobile Directory
CHILTON
AUTOMOBILE
DIRECTORY
CHILTON CO., PUBLISHERS
Market & 49th Sts., Philadelphia
The CHILTON AUTOMOBILE DIRECTORY is the book which tells you where to buy. Price, $1.00 per copy. Its use will save you many dollars, because it contains the names and addresses of all makes of automobiles, parts, accessories, tools, etc., with classifications for quick reference.

WHERE do you buy the things you sell?

Do you confine your purchases to a few, or do you learn the names of the makers of the various products you require, so as to be able to purchase first-hand to the best advantage?

In the course of a year you buy many miscellaneous supplies for your business. Even though you may get most of these through a source which is satisfactory to you, undoubtedly you spend a great deal of time trying to find the names and addresses of makers of various products, either for the purpose of improving on what you have, or obtaining better prices.

Where do you get these names and addresses? If you are up to date, you use the CHILTON AUTOMOBILE DIRECTORY, which is issued quarterly—January, April, July and October. There is no other publication in the United States which accurately gives you, under the proper classification, the names of manufacturers of all products which enter into the manufacture and sale of automobiles, including all sorts of accessories for the car, the garage and the shop.

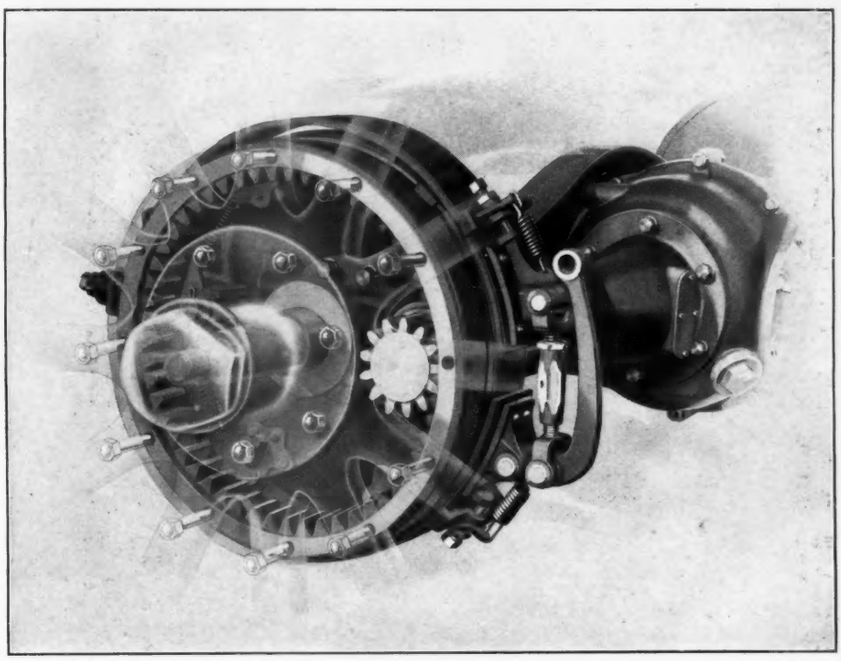
Not only is the buying-right feature of untold value to you, but if you are informed, you can buy what your customers want at prices which are satisfactory and from sources which are convenient. Merely by referring to a book which contains accurate classifications of everything you ought to have, you are able to make your purchases judiciously, and this will add very materially to your success in business. This valuable knowledge is yours for $1.00, so why not place your order for a copy of the April DIRECTORY, which is now ready for distribution?

The efficiency, life and salability of any make of motor truck will be greatly increased by adopting

Celfor Axles

INTERNAL GEAR DRIVE

Power is applied to the wheel at a considerable distance from its center, similar to the rear sprocket of a chain drive.



Both sets of brakes are on the rear wheels, thereby relieving power transmission mechanism of braking strain.

Celfor Axles are designed for trucks of from ¾ to 10 ton capacities and offer the most practical, economical and efficient drive obtainable for motor trucks. They are absolutely quiet, light in weight, have all working parts enclosed and dust-proof.

There is a solid I-beam axle to carry the load and a ribbed tubular live axle, to transmit the power, with both built into one unit.

The superiority of Celfor Axles can readily be demonstrated to any interested truck manufacturer. Send for our catalog and complete information.

Celfor Tool Company

BUCHANAN, MICHIGAN U.S.A.

The Space-Buying Problem

YOU want every dollar of your advertising appropriation placed where it will bring you one hundred cents' worth of effective publicity.

IN days gone by, it was often the ablest solicitor who secured the bulk of an appropriation, or advertising was placed because of sentiment, or friendship, or because competitors used certain mediums. The only just basis—circulation, quality and quantity—received but scant consideration. Small wonder that many publishers took advantage of this indifference on the part of space buyers and charged rates out of all proportion to the service rendered.

BUT this attitude is gradually changing. Advertisers and agents are buying space as a commodity, and insist on knowing that they are actually getting that for which they pay. But how to be *sure?* That is the problem to which

A. B. C. SERVICE

(**Audit Bureau of Circulations**)

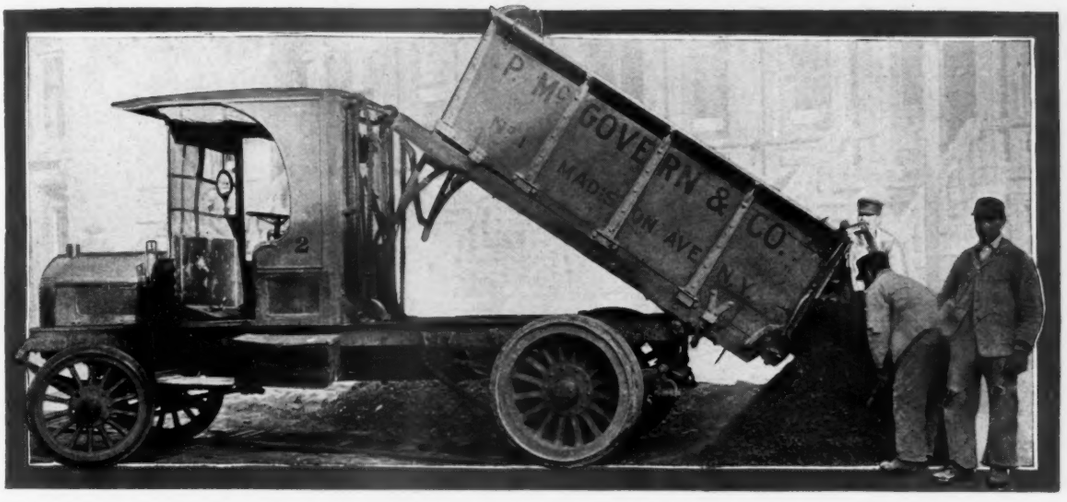
IS THE ONLY LOGICAL ANSWER

THE Audit Bureau of Circulations is a national association composed of the largest advertisers and advertising agents in the country. The publisher-members are those who permit the Association to audit their circulation books and make their findings public.

A. B. C. Service gives you cold, hard facts about circulation—quality, quantity and distribution. It assembles figures, checks them, verifies them, puts them in a standardized form so you can analyze them at a glance. You want facts about circulations because they mean well-spent advertising appropriations. You *get facts* from publications which are members of the A. B. C.

IN this connection it may be interesting to you to know that CHILTON publications—the AUTOMOBILE TRADE JOURNAL and the COMMERCIAL CAR JOURNAL—are Charter Members of the A. B. C. The COMMERCIAL CAR JOURNAL, in fact, is the *only* truck paper which, to date, is a member. The Auditors' reports for both these journals are now ready for distribution. Get them, analyze them, compare them with others in the same field. You may get some different ideas as to the value of the various motor mediums.

MR. RUSSELL WHITMAN, Managing Director of the A. B. C., 15 E. Washington Street, Chicago, will gladly supply any advertiser or publisher with full details.



Helping to Build New York's New Subway

SUBWAY work is rush work. Delay is fatal to the contractor, for time is money. And in this tremendous test of speed and endurance, Mack and Saurer trucks are making some remarkable records.

The 7½ ton Mack truck shown above is one of two with which Patrick McGovern & Company, contractors, are speeding up their work on the Lexington Avenue branch of New York's new subway system. These trucks are used to haul wet concrete from the East River to the job, a distance of about a mile. On this return trip they haul muck, in loads weighing as much as 15,000 pounds.

For over two years these trucks have been working continuously on double and sometimes triple shifts. In spite of the comparatively short haul, and frequent traffic interruptions they have averaged 1300 miles a month.

This is just a sample of the work Mack and Saurer trucks are doing for the subway contractors. Most of them working double and sometimes triple shifts, and all of them are speeding up the job and making money for their owners.

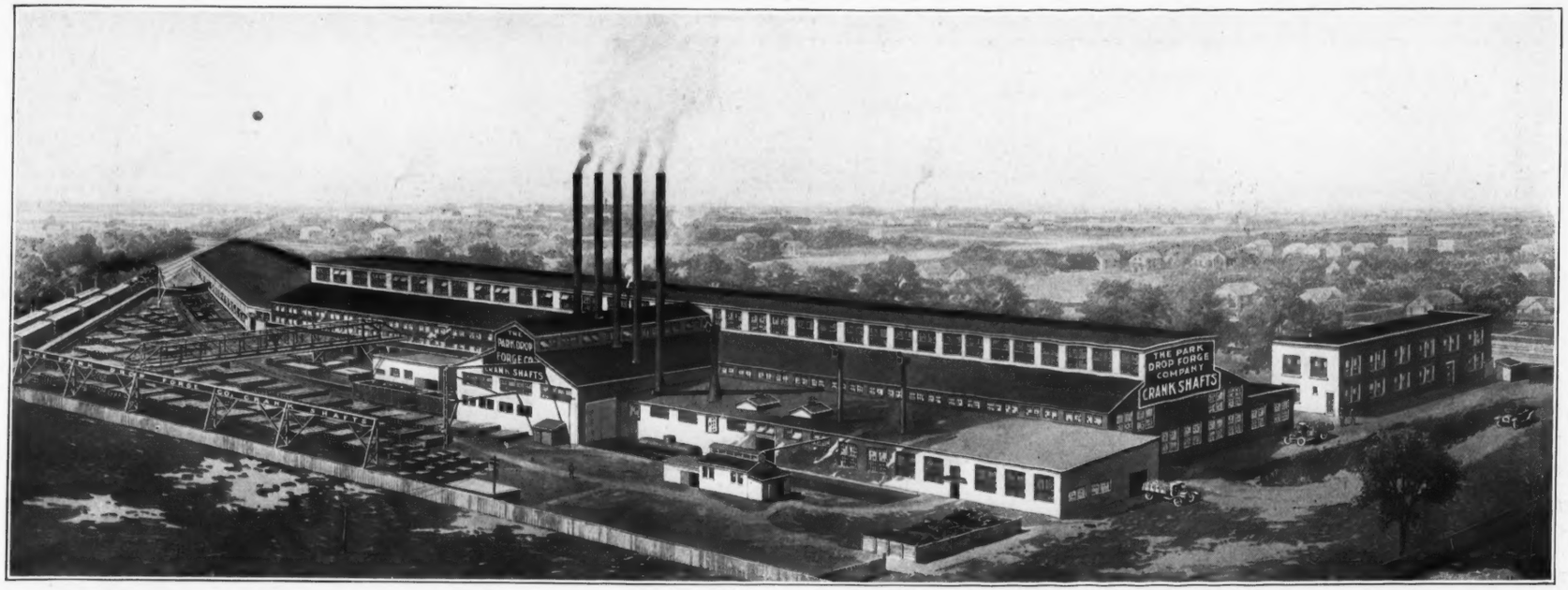
Mack and Saurer trucks have made good in every field of transportation. Let us show you how they can be used to solve *your* particular problem.

SALES REPRESENTATION IN THE FOLLOWING CITIES

New York Chicago Boston Albany Newark Philadelphia
San Francisco Los Angeles Buffalo Baltimore

INTERNATIONAL MOTOR COMPANY
64th Street and West End Avenue, New York City

When Writing, Please Say—"Saw Your Ad. in the C C J"



THE FIREPROOF HOME of PARK CRANKSHAFTS, TRUCK AXLES and HEAVY DIE FORGINGS

39 LARGE HAMMERS and HYDRAULIC FORGING PRESSES
CHEMICAL AND PHYSICAL LABORATORIES
HEAT-TREATING PLANT. 16 FURNACES
LARGE STOCK CLASSIFIED STEELS. ANALYSIS CHECKED IN PARK LABORATORY

Park Forgings have *always* been guaranteed as regards Chemical Analysis, Physical Properties, and Bearing Hardness

PARK DROP FORGE COMPANY, CLEVELAND

McGRAW SOLID TIRES

Since the cost of tires is the greatest single factor in the normal operating expense of trucks, it is very pertinent to ask: What are 3000 miles worth to you?

It is pertinent because you can get 3000 miles of guaranteed service for nothing—if you use E. C. McGraw Tires.

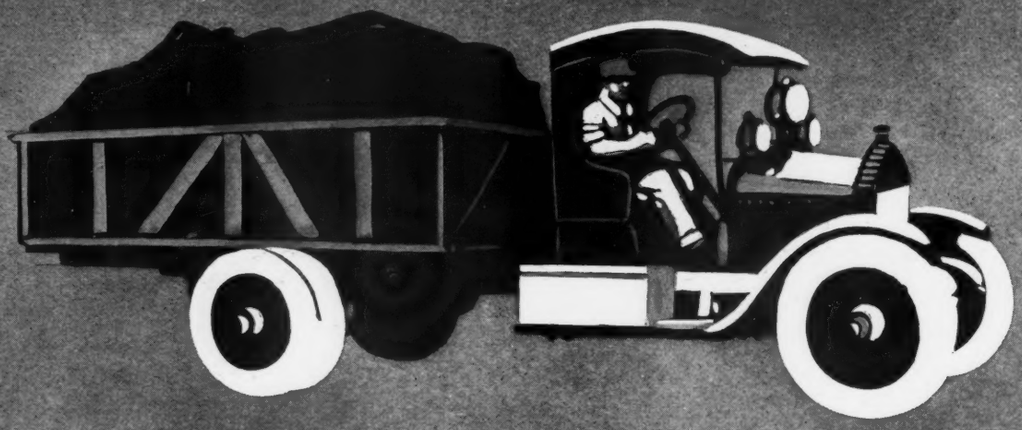
How? The answer is simple. Look at the illustration above. You will see that the E. C. McGraw is larger than the standard S. A. E. tire—contains 20% more rubber. That extra 20% is good for 3000 additional miles—for which we make no extra charge.

We make a top-notch tire—the very best we possibly can—and give it 20% more rubber than other tires. Because of this, we guarantee it for 10,000 miles instead of the customary 7000. Our prices are no higher than those of other tire makers, hence we virtually give you 3000 miles of service free. That surely must mean considerable to you.

This is only one of the various advantages possessed by E. C. McGraw Tires, but it is such an important one that, if you are at all concerned about economy and efficiency, you will lose no time in learning more about E. C. McGraw Tires and what they mean to you.

The McGraw Tire & Rubber Company

Main Office and Factory — East Palestine, Ohio — Branches and Service Stations in Principal Cities



CHASE

"THE WORM DRIVE LINE"

VALUE

From radiator to rear axle ***value*** has been built into every Chase truck---***value*** that determines the actual performance of the car after years of use.

The dealer selling Chase Motor Trucks realizes this value and capitalizes upon it.

When he says "Chase" to the buyer he establishes a standard and his selling possibilities are strengthened two-fold. Chase trucks make customers of prospects.

WHY THE BUYER DECIDES ON CHASE

Continental Motors—Brown-Lipe Transmissions—David Brown Type of Worm Drive and Sheldon Axles—Hydraulic Pressed Steel Frames

A flexible line of models.

You will be interested in reading our new literature.

Write for it today.

CHASE MOTOR TRUCK CO.

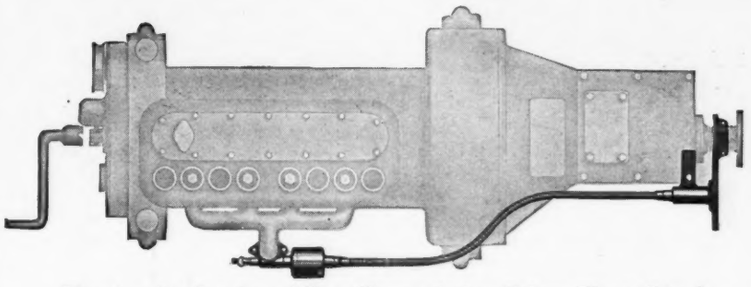
104 West Street, Syracuse, N. Y.

"Chase Your Delivery"

PIERCE

Controllers and Governors

are the accepted standard on the better known cars



Showing Application of New, Transmission-Driven Pierce Speed Controller, Model G

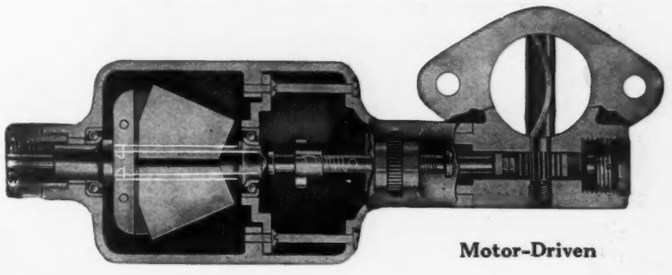
This is our latest type of speed controller.

It is driven from the propeller shaft at the rear end of the transmission and possesses many advantages over other types.

It controls vehicle speed only, and does not interfere with the speed of the motor. Easily applied. Especially adapted for light trucks.

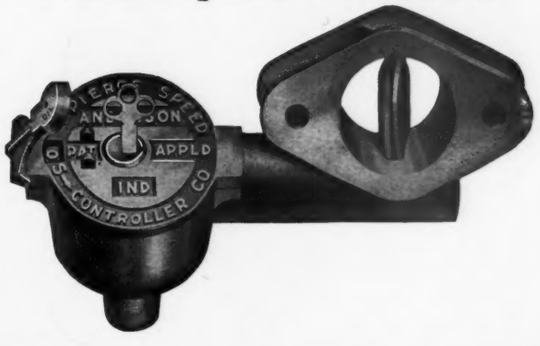
Pierce Motor Governor

The Pierce Motor Governor is too well known and too extensively used to require extended explanation. It is operated direct from the engine, being attached to any exposed rotating part of the motor. It is adjustable to any desired number of revolutions per minute. Used on the leading motors.



Motor-Driven

Pierce Speed Controller



This Speed Controller is the type which has made the name PIERCE famous. It is operated from the front wheel and leaves the motor free under any and all conditions. It has proved its value to hundreds of concerns all over the country.

Some one of these devices should be on your trucks. They are the very best of their kind obtainable, increasing efficiency and durability and promoting safety and economy. Write for particulars.

The Pierce Speed Controller Company

Anderson, Indiana, U. S. A.

Originators of Speed-Controlling Devices for Gasoline-Driven Cars

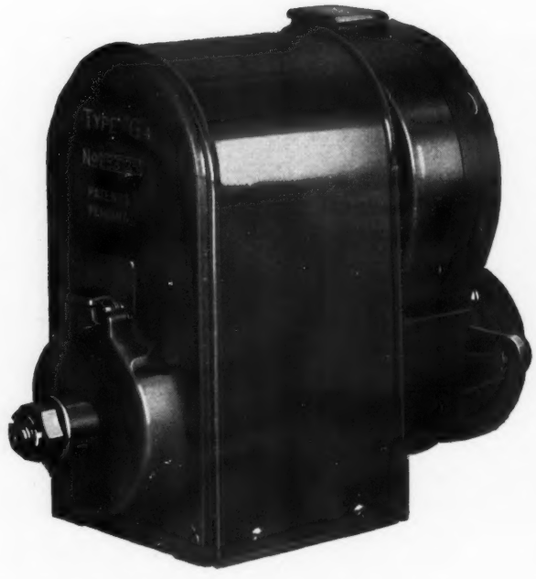
EISEMANN

Indicative of the determination of the Eisemann Magneto Company to take care of American manufacturers without delay, announcement is made of another increase of the present large factory.

Last summer, long before hostilities broke out in Europe, an increase of more than a third additional space was arranged for. This has just been occupied with full equipment for manufacturing. But with recent developments even this space was insufficient for us to keep up with growing demands. So we have just started upon an even larger increase of manufacturing space and facilities which we will occupy within a very few weeks.

While some of this demand for Eisemann instruments has been occasioned by war conditions, that have not affected our products, the greatest proportion of it is a natural growth as a result of the realization on the part of car makers, of an unquestioned supremacy of Eisemann products from a standpoint of efficiency, durability and dependability.

Additions to Eisemann Factory



The Eisemann Magneto Co.

Sales and General Offices
32-33d St., Brooklyn, N. Y.

New York 245 W. 55th St. | Indianapolis, Ind. 415-417 N. Capitol Ave. | Detroit, Mich. 802 Woodward Ave.

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Kelly-Springfield

TIRES FOR COMMERCIAL VEHICLES

For maximum mileage at minimum cost, equip your trucks with Kelly-Springfield sectional Block Tires on the rear wheels and Kelly-Springfield Pressed-On or Demountable Solid Tires on the front wheels. This is the ideal tire equipment for commercial cars. It will deliver record mileage even under unusually severe service conditions.

Kelly-Springfield Tire Company

Akron, Ohio

Branches in all Principal Cities

No more guess work-No more rule-of-thumb extravagance

PACKARD

New Model Trucks mean certainty in motor hauling

The first complete series of silent, up-to-date chainless trucks. Seven sizes—1-ton, 1½-ton, 2-ton, 3-ton, 4-ton, 5-ton and 6-ton—a truck to exactly meet the needs of your particular business.

They stand for CERTAINTY—the one quality that counts most in motor hauling, the one quality that is the most difficult to buy.

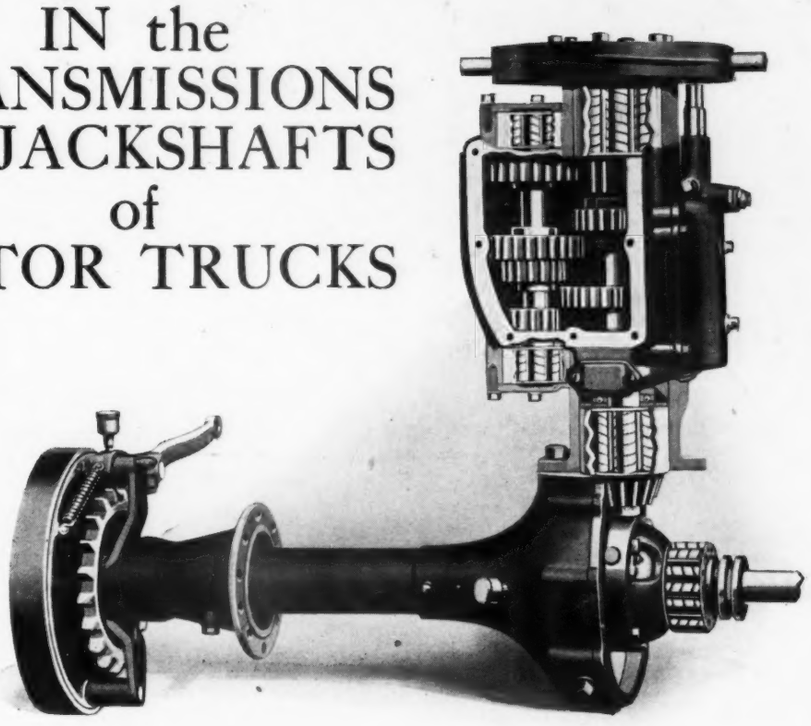
There are plain, everyday and perfectly obvious mechanical reasons for the dollar-saving ability of these trucks, their great range of activity and their unapproached efficiency.

Begin better and cheaper hauling in your business by inspecting the Packard New Model Trucks, or if you cannot do that right away, do the next best thing, send for a catalog.

Packard Motor Car Company-Detroit

HYATT ROLLER BEARINGS

IN the TRANSMISSIONS and JACKSHAFTS of MOTOR TRUCKS



Many of the leading Motor Truck manufacturers have found Hyatt Roller Bearings the logical solution of their transmission and jackshaft bearing problems.

They have found through years of experience that Hyatt Bearings give the dependable service they demand from motor truck bearings.

Hyatt Bearings with their flexible spiral rollers are best fitted to stand the hard work of motor truck service. These flexible rollers cushion road shock—keep gears and shafts in alignment and relieve the surrounding parts of undue strain.

These and many other advantages are responsible for their universal use in every size and type of Motor Vehicle.

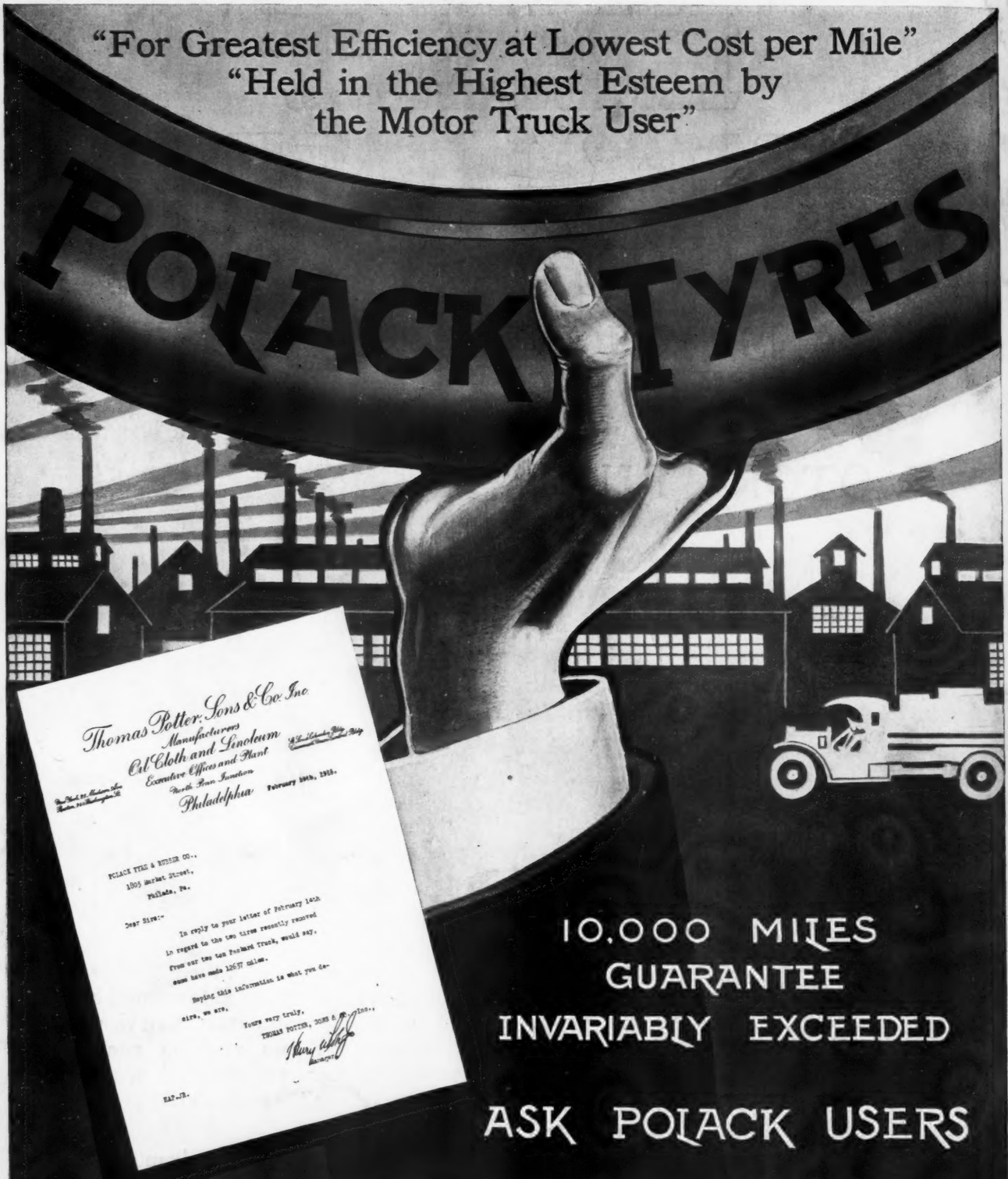
HYATT ROLLER BEARING CO.

DETROIT CHICAGO
NEWARK, N.J.

When Writing, Please Say—"Saw Your Ad. in the C C J"

"For Greatest Efficiency at Lowest Cost per Mile"
"Held in the Highest Esteem by
the Motor Truck User"

POLACK TYRES



10,000 MILES
GUARANTEE
INVARIABLY EXCEEDED

ASK POLACK USERS

POLACK TYRE & RUBBER CO.

1876 BROADWAY, -- NEW YORK.

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